Montana historical energy statistics

6th edition

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SIXTH EDITION

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ENERGY DIVISION
DEPARTMENT OF NATURAL RESOURCES AND CONSERVATION
1520 East Sixth
Helena, Montana 59620-2301
(406) 444-6697

ACKNOWLEDGMENTS

This report is primarily an updated version of the fifth edition of *Montana Historical Energy Statistics*, prepared by Lynda Steele in 1984. The most recent data were compiled by Nancy McLane, research specialist in the Energy Division, DNRC. Dan Vichorek edited the report; June Virag prepared the figures; Barbara Lien did the typesetting and layout; and Emelia Satre handled the word processing.

In addition, many individuals from private organizations, utilities, and government agencies provided data for this publication.

CONTENTS

FIGURES

INTRODUCTION

The *Montana Historical Energy Statistics* is a compilation of energy reserves, sales, consumption, and production data gathered from state, federal, and private sources. The statistics in this report are organized as follows: Chapter 1 presents Montana's total energy production and consumption of energy resources, broken down by fuel type and by sector. Chapters 2-5 contain more detailed statistics grouped by fuel type (electricity, coal, natural gas, and petroleum). Prefacing each chapter are highlights which depict changes from the previous year.

The reader is cautioned against data comparisons between tables drawn from different sources. First, this report uses definitions developed by DOE for the residential, commercial, industrial, transportation, and electric utility end-use sectors. These sector definitions are not necessarily the same as those used by other data sources. Second, in some instances, two sources may show markedly different figures for basically the same data item. Such discrepancies are the result of differences in data collection methods and reporting procedures. The *Montana Historical Energy Statistics* recognizes that these differences exist, but, in general, does not include explanations for the differences. Readers needing detailed explanations of the definitions, data collection methods, etc., should refer to the original data sources or contact the Energy Division for further explanation.

Sales of energy products do not necessarily indicate consumption of those products. Some forms of energy may be added to storage facilities during the reporting period, causing sales to exceed consumption. Similarly, actual consumption may exceed sales if stockpiles are reduced by withdrawals from storage.

When DOE changes its reporting procedures or estimation methods, data from previous years are often revised to provide a time series of reasonably comparable data. For the purposes of this document, individual figures or years of data have been revised according to the most recently published information. In most cases, however, these revisions are not noted in the tables.

In some cases, individual data entries do not add to the printed totals. This can occur when the individual items have been rounded independently of the totals, or when the totals are based on unpublished revisions of the individual entries. (For example, many federal publications are published both monthly and annually, but the annual figures reflect unpublished additions, corrections, and revisions to the monthly data.) In such cases, the reader should consider the individual data entries indicative of the measurement in question rather than definitive.

DOE source publications often change the units in which data are reported; for example, DOE may change from reporting natural gas in millions of cubic feet to billions of cubic feet. Rather than revising the entire data series to reflect such a change, the *Montana Historical Energy Statistics* generally retains the original reporting units, appending zeros as necessary. For this reason, trailing zeros in figures should be considered place holders rather than significant digits.

The compilation of this publication was completed in September 1989. The most current data available at the time were used. Final energy data compiled by the U.S. Department of Energy typically are not published until 10-12 months after the end of the year.

Comments, corrections, suggestions, and requests for assistance as they apply to this publication should be addressed to the Energy Division, Department of Natural Resources and Conservation, 1520 E. Sixth Avenue, Helena, Montana 59620; telephone (406) 444-6697.

ABBREVIATIONS AND ACRONYMS

AGA	American Gas Association
bbl	Barrel
Bcf, bcf	Billion cubic feet
Btu	British thermal unit
DNRC	Montana Department of Natural Resources and Conservation
DOE	U.S. Department of Energy
DRB	Demonstrated reserve base
E	Estimated figure
EIA	U.S. Department of Energy, Energy Information Administration
FERC	Federal Energy Regulatory Commission
GW	Gigawatt
GWh	Gigawatt-hour
HES	Montana Historical Energy Statistics
kW	Kilowatt
kWh	Kilowatt-hour
LNG	Liquefied natural gas
LPG	Liquefied petroleum gas
Mcf, mcf	Thousand cubic feet
MDU	Montana-Dakota Utilities
MEC	Montana Energy Council
Mbbl	Thousand barrels
MMcf	Million cubic feet
MPC	Montana Power Company
Mtons	Thousand short tons
MW	Megawatt
MWh	Megawatt-hour
NA	Not available
NGL	Natural gas liquids
P	Preliminary figure
PPL	Pacific Power and Light Company
PSC	Montana Public Service Commission
psia	Pounds per square inch absolute
PSP&L	Puget Sound Power and Light Company
R, r	Revised
SIC	Standard Industrial Classification (code)
t	(Short) ton
TBtu	Trillion British thermal units
w	Withheld to avoid disclosure of individual company data
W	Watt
Wh	Watt-hour
WWP	Washington Water Power Company

ENERGY CONVERSION FACTORS

Fuel	Approximate Btu Content
Coal:	
Anthracite (U.S. average)	25,400,000 Btu/short ton
Bituminous (U.S.average)	23,650,000 Btu/short ton
Subbituminous (Montana)	17,500,000 Btu/short ton
Lignite (Montana)	13,000,000 Btu/short ton
(Dry) Natural gas	1,000 Btu/cubic foot
Crude oil	5,610,000 Btu/barrel
Refined petroleum products:	
Motor gasoline	5,250,000 Btu/barrel
Distillate fuel oil	5,830,000 Btu/barrel
Residual fuel oil	6,290,000 Btu/barrel
Kerosene	5,670,000 Btu/barrel
Liquefied petroleum gases (propane-butane mix)	4,011,000 Btu/barrel
Lubricants	6,070,000 Btu/barrel
All products (average)	5,520,000 Btu/barrel
Electricity	3,412 Btu/kilowatt-hour

NOTE: This table shows the conversion factors used by DNRC's Energy Division. The U.S. Department of Energy uses slightly different values for the approximate heat content of various fuels. These values are based, in part, on the average Btu value of fuels burned nationwide in a particular year. (For example, the moisture content of anthracite coal affects its heat content; DOE uses the average Btu value of anthracite burned in the United States in a given year as the approximate heat content of anthracite coal for that year.)

Extensive tables showing the approximate heat content of various fuels over the past ten years can be found in the U S. Department of Energy, Energy Information Administration's publication, *Monthly Energy Review* (EIA-0035)

GLOSSARY

Average Megawatt: A unit of energy output over a specified time period. It is equivalent to the total energy in megawatt-hours divided by 8,760 (the number of hours in a year).

Average Mine Price: The ratio of the total value of the coal produced at the mine to the total production tonnage (See **F.O.B. Mine Price**).

Barrel: A volumetric unit of measure for crude oil and petroleum products equivalent to 42 U.S. gallons.

Bcf: One billion cubic feet.

Btu (British Thermal Unit): A standard unit for measuring the quantity of heat required to raise the temperature of 1 pound of water by 1 degree Fahrenheit (F).

Capacity: Amount of electric power delivered or required for which a generator, turbine, transformer, transmission circuit, station, or system is rated.

Coal: A black or brownish-black solid combustible substance formed by the partial decomposition of vegetable matter without free access to air and under the influence of moisture and, often, increased pressure and temperature. The rank of coal (anthracite, bituminous, subbituminous, and lignite) is determined by its heating value.

Anthracite: Hard and jet black with a high luster, it is the highest rank of coal and is mined in northeastern Pennsylvania. Anthracite contains approximately 22 to 28 million Btu per ton as received.

Bituminous: The most common coal, it is soft, dense, and black with well-defined bands of bright and dull material. Bituminous is ranked between anthracite and subbituminous and is mined chiefly in Kentucky, Pennsylvania, and West Virginia. The heating value ranges from 19 to 30 million Btu per ton as received.

Lignite: A brownish-black coal of the lowest rank; it is mined in North Dakota, **Montana**, and Texas. The heat content of lignite ranges from 9 to 17 million Btu per ton as received.

Subbituminous: A dull black coal ranking between lignite and bituminous; it is mined chiefly in **Montana** and Wyoming. The heat content of subbituminous coal ranges from 16 to 24 million Btu per ton as received.

Coal Bed: A bed or stratum of coal. Also called a **coal seam**.

Coal Rank: A classification of coal based on fixed carbon, volatile matter, and heating value.

Demand: The rate at which electric energy is delivered to or by a system, part of a system, or piece of equipment at a given instant or averaged over any designated period of time. (See **Load**).

Demonstrated Reserve Base: A collective term for the sum of coal in both measured and indicated resource categories of reliability that represents 100 percent of the coal in these categories in-place as of a certain date. Includes beds of bituminous coal and anthracite 28 or more inches thick and beds of subbituminous coal 60 or more inches thick that occur at depths to 1,000 feet. Includes beds of lignite 60 or more inches thick that can be surface mined. Includes also thinner and/or deeper beds that presently are being mined or for which there is evidence that they could be mined commercially at this time. Represents that portion of the identified coal resource from which reserves are calculated.

Distillate Fuel Oil: A general classification for one of the petroleum fractions produced in conventional distillation operations. It is used primarily for space heating, on-and-off-highway diesel engine fuel (including railroad engine fuel and fuel for agricultural machinery), and electric power generation. Included are products known as No. 1, No.2 and No. 4 fuel oils; No. 1, No. 2, and No. 4 diesel fuel.

End-Use Sectors: Energy use is assigned to the major end-use sectors according to the following guidelines as closely as possible:

Residential sector: Energy consumed by private household establishments primarily for space heating, water heating, air conditioning, cooking, and clothes drying.

Commercial sector: Energy consumed by nonmanufacturing business establishments, including motels, restaurants, wholesale businesses, retail stores, laundries, and other service enterprises; by health, social, and educational institutions; and by federal, state, and local governments.

Industrial sector: Energy consumed by manufacturing, construction, mining, agriculture, fishing, and forestry establishments.

Transportation sector: Energy consumed to move people and commodities in both the public and private sectors, including military, railroad, vessel bunkering, and marine uses, as well as the pipeline transmission of natural gas.

Electric utility sector: Energy consumed by privately and publicly owned establishments that generate electricity primarily for resale.

Extraction Loss: The reduction in volume of natural gas resulting from the removal of natural gas liquid constituents at natural gas processing plants.

Feedstock: Natural gas used as a raw material for its nonfuel chemical properties in creating an end product.

F.O.B. Mine Price: The "free on board" mine price. This is the price paid for coal measured in dollars per short ton at the mining operation site and, therefore, does not include freight/shipping and insurance costs.

Fossil Fuel: Any naturally occurring fuel of an organic nature, such as coal, crude oil, and natural gas.

Fossil Fuel Plant: A plant using coal, oil, gas or other fossil fuel as its source of energy.

Fuel: Any substance that can be burned to produce heat; it sometimes includes materials that can be fissioned in a chain reaction to produce heat.

Gas Condensate Well: A gas well that produces from a gas reservoir containing considerable quantities of liquid hydrocarbons in the pentanes and heavier range generally described as "condensate."

Gas Well: A well that is completed for the production of gas from either nonassociated gas reservoirs or associated gas and oil reservoirs.

Gasohol: A blend of finished motor gasoline (leaded or unleaded) and alcohol (generally ethanol but sometimes methanol) in which 10 percent or more of the product is alcohol.

Generation (Electric): The act or process of producing electric energy from other forms of energy; also, the amount of electric energy produced, expressed in watthours (Wh).

Gross: The total amount of electric energy produced by the generating units in a generating station or stations, measured at the generator terminals.

Net: Gross generation less the electric energy consumed at the generating station for station use. (Energy required for pumping at pumped-storage plants is regarded as plant use and is subtracted from the gross generation and from hydroelectric generation.)

Gigawatt (GW): One billion watts.

Gigawatt-hour (GWh): One billion watt-hours.

Gross Withdrawals: Full well stream volume excluding condensate separated at the lease.

Horsepower: A unit of power equal to 746 watts.

Hydroelectric Power Plant: A plant in which the turbine generators are driven by falling water.

Identified Resources: Coal deposits whose location, rank, quality, and quantity are known from geologic evidence supported by engineering measurements. Included are beds of bituminous coal and anthracite 14 or more inches thick and beds of subbituminous coal and lignite 30 or more inches thick that occur at depths to 6,000 feet. The existence and quantity of these beds have been delineated within specified degrees of geologic assurance as measured, indicated, or inferred. Also included are thinner and/or deeper beds that presently are being mined or for which there is evidence that they could be mined commercially.

Indicated Resources: Coal for which estimates of the rank, quality, and quantity have been computed partly from sample analyses and measurements and partly from reasonable geologic projections. Indicated resources are computed partly from specified measurements and partly from projection of visible data for a reasonable distance on the basis of geologic evidence. The points of observation are 1/2 to 1 1/2 miles apart. Indicated coal is projected to extend as a 1/2-mile-wide belt that lies more than 1/4 mile from the outcrop or points of observation or measurement.

Inferred Resources: Coal in unexplored extensions of demonstrated resources for which estimates of the quality and size are based on geologic evidence and projection. Quantitative estimates are based largely on broad knowledge of the geologic character of the bed or region and where few measurements of bed thickness are available. The estimates are based primarily on an assumed continuation from demonstrated coal for which

there is geologic evidence. The points of observation are 1 1/2 to 6 miles apart. Inferred coal is projected to extend as a 2 1/4-mile-wide belt that lies more than 3/4 mile from the outcrop or points of observation or measurement.

Installed Nameplate Capacity: The capacity as shown on the manufacturer's identification plate. This appears on apparatus, such as generating units, turbines, or other equipment in a station or system. Installed station capacity does not include auxiliary or house units. The nameplate capacity is the full-load continuous rating of a generator, prime mover, or other electrical equipment under specified conditions as designated by the manufacturer. It is usually indicated on a nameplate attached mechanically to the equipment.

Kerosene: A petroleum distillate that boils at a temperature between 300-550 degrees F, that has a flash point higher than 100 degrees F, that has a gravity range from 40-46 degrees API, and that has a burning point in the range of 150-175 degrees F. Included are the two classifications, No. 1-K and No. 2-K, and all grades of kerosene called range or stove oil which have properties similar to No. 1 fuel oil, but with a gravity of about 43 degrees API and a maximum end-point of 625 degrees F. Kerosene is used in space heaters, cook stoves, and water heaters and is suitable for use as an illuminant when burned in wick lamps.

Kilowatt (KW): One thousand watts.

Kilowatt-hour (kWh): One thousand watt-hours.

Lease Condensate: A natural gas liquid recovered from gas well gas (associated and nonassociated) in lease separators or natural gas field facilities. Lease condensate consists primarily of pentanes and heavier hydrocarbons.

Liquefied Natural Gas (LNG): Natural gas that has been liquefied by reducing its temperature to minus 260 degrees F at atmospheric pressure.

Liquefied Petroleum Gases (LPG): Propane, propylene, butanes, butylene, butane-propane mixtures, ethane-propane mixtures, and isobutane produced at refineries or natural gas processing plants, including plants that fractionate raw natural gas plant liquids.

Load (Electric): The amount of electric power delivered or required at any specific point or points on a system.

Marketed Production: Gross withdrawals less gas used for repressuring, quantities vented and flared, and nonhydrocarbon gases removed in treating or processing operations.

Mcf: One thousand cubic feet.

Measured Resources: Coal for which estimates of the rank, quality, and quantity have been computed, within a margin of error of less than 20 percent, from sample analyses and measurements from closely spaced and geologically well-known sample sites. Measured resources are computed from dimensions revealed in outcrops, trenches, mine workings, and drill holes. The points of observation and measurement are so closely spaced and the thickness and extent of coals are so well defined that the tonnage is judged to be accurate within 20 percent. Although the spacing of the points of observation necessary to demonstrate continuity of the coal differs from region to region according to the character of the coalbeds, the points of observation are no greater than 1/2 mile apart. Measured coal is projected to extend as a 1/4-mile belt from the outcrop or points of observation or measurement.

Megawatt (MW): One million watts.

Megawatt-hour (MWh): One million watt-hours.

MMcf: One million cubic feet.

Natural Gas: A mixture of hydrocarbon compounds and small quantities of various nonhydrocarbons existing in the gaseous phase or in solution with crude oil in natural underground reservoirs at reservoir conditions. The principal hydrocarbons usually contained in the mixture are methane, ethane, propane, butane, and pentanes. Typical nonhydrocarbon gases that may be present in reservoir natural gas are carbon dioxide, helium, hydrogen sulfide, and nitrogen. Under reservoir conditions, natural gas and the liquefiable portions occur either in a single gaseous phase in the reservoir or in solution with crude oil, and are not distinguishable at the time as separate substances.

Natural Gas—Associated-Dissolved: The combined volume of natural gas that occurs in crude oil reservoirs either as free gas (associated) or as gas in solution with crude oil (dissolved).

Natural Gas—Dry: The actual or calculated volumes of natural gas that remain after the liquefiable hydrocarbon portion has been removed from the gas stream (i.e., gas after lease, tield, and/or plant separation), and any volumes of nonhydrocarbon gases have been removed where they occur in sufficient quantity to render the gas unmarketable.

Natural Gas—Nonassociated: Natural gas not in contact with significant quantities of crude oil in a reservoir.

Natural Gas—Wet After Lease Separation: The volume of natural gas remaining after removal of lease condensate in lease and/or field separation facilities, if any, and after exclusion of nonhydrocarbon gases where they occur in sufficient quantity to render the gas unmarketable. Natural gas liquids may be recovered from volumes of natural gas, wet after lease separation, at natural gas processing plants.

Natural Gas Liquids: Those hydrocarbons in natural gas that are separated from the gas through the processes of absorption, condensation, adsorption, or other methods in gas processing or cycling plants. Generally, such liquids consist of propane and heavier hydrocarbons and are commonly referred to as condensate, natural gasoline, or liquefied petroleum gases. Where hydrocarbon components lighter than propane are recovered as liquids, these components are included with natural gas liquids.

Natural Gas Plant Liquids: Natural gas liquids recovered from natural gas in gas processing plants, and in some situations, from natural gas field facilities. Natural gas liquids extracted by fractionators are also included. These liquids are classified as follows: ethane, propane, ethane-propane mix, isobutane, butane, butane-propane mix, isopentane, natural gasoline, plant condensate, unfractionated stream, and other products from natural gas processing plants (i.e., products meeting the standards of finished petroleum products produced at natural gas processing plants, such as finished motor gasoline, finished aviation gasoline, special naphthas, kerosene, distillate fuel oil, and miscellaneous products).

Petroleum: A generic term applied to oil and oil products in all forms, such as crude oil, lease condensate, unfinished oil, refined petroleum products, natural gas plant liquids and non-hydrocarbon compounds blended into finished petroleum products.

Petroleum Products: Petroleum products are obtained from the processing of crude oil (including lease condensate), natural gas, and other hydrocarbon compounds. Petroleum products include unfinished oils, natural gasoline and isopentane, plant condensate, unfractionated stream, liquefied petroleum gases, aviation gasoline, motor gasoline, naphtha-type jet fuel, kerosene-type jet fuel, kerosene, distillate fuel oil, residual fuel oil, naphtha less than 400°F end-point, other oils over 400°F end-point, special naphthas, lubricants, waxes, petroleum coke, asphalt, road oil, still gas, and miscellaneous products.

Petroleum Refinery: An installation that manufactures finished petroleum products from crude oil, unfinished oils, natural gas liquids, other hydrocarbons, and alcohol.

Proved Reserves of Crude Oil: Proved reserves of crude oil, as of December 31 of the report year, are the estimated quantities of all liquids defined as crude oil that geological and engineering data show with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Reservoirs are considered proved if economic producibility is supported by actual production or conclusive formation test (drill stem or wire line), or if economic producibility is supported by core analyses and/or electric or other log interpretations.

Proved Reserves of Natural Gas: Proved reserves of natural gas, as of December 31 of the report year, are the estimated quantities that analysis of geologic and engineering data show with reasonable certainty to be recoverable in future years from known reservoirs under existing economic and operating conditions.

Reservoirs are considered proved if economic producibility is supported by actual production or conclusive formation test (drill stem or wire line), or if economic producibility is supported by core analyses and/or electric or other log interpretations.

Proved Reserves of Natural Gas Liquids: Proved reserves of natural gas liquids, as of December 31 of the report year, are those volumes of natural gas liquids (including lease condensate) that with reasonable certainty have been shown to be separable in the future from proved natural gas reserves under existing economic and operating conditions.

Recoverable Reserves: The amount of coal that can be recovered (mined) from the coal deposits at active, producing mines as of the end of the year.

Recovery Factor: The percentage of total tons of coal estimated to be recoverable from a given area in relation to the total tonnage estimated to be in the demonstrated reserve base. The estimated recovery factors for the demonstrated reserve base generally are 50 percent for underground mining methods and 80 percent for surface mining methods. More precise recovery factors can be computed by determining the total coal in place and the total amount of coal recoverable in any specific locale.

Recovery Percentage: The percentage of coal that can be recovered from the coal deposits at existing mines.

Reserve: That portion of the demonstrated reserve base that is estimated to be recoverable at the time of determination. The reserve is derived by applying a recovery factor to that component of the identified coal resource designated as the demonstrated reserve base.

Residual Fuel Oil: The topped crude or refinery operation that includes No. 5 and No. 6 fuel oils, Navy Special fuel oil, and Bunker C fuel oil. Residual fuel oil is used for the production of electric power, space heating, vessel bunkering, and various industrial purposes. Includes imported crude oil to be burned as a fuel.

Short Ton: A unit of weight equal to 2,000 pounds. All tonnages used in this publication are in short tons.

Steam-Electric (Conventional) Plant: A plant in which the prime mover is a steam turbine. The steam used to drive the turbine is produced in a boiler by heat from burning fossil fuels. (See **Fossil Fuel** and **Fuel**.)

Surface Mine: A mine producing coal that is usually within a few hundred feet of the earth's surface. Overburden (earth above or around the coal) is removed to expose the coal bed. The bed is then mined using surface excavation equipment such as draglines, power shovels, bulldozers, loaders and augers. This type of mine may also be known as an **area**, **contour**, **open-pit**, **strip**, or **auger mine**.

Underground Mine: A mine tunneling into the earth to the coal bed. Underground mines are classified according to the type of opening used to reach the coal—i.e. **drift** (level tunnel), **slope** (inclined tunnel), or **shaft** (vertical tunnel).

Unit Value, Wellhead: Represents the wellhead sales price, including charges for natural gas plant liquids subsequently removed from the gas, gathering and compression charges, and state production, severance, and/or similar charges.

Watt: The electrical unit of power or rate of doing work. A watt is the rate of energy transfer equivalent to 1 ampere flowing under pressure of 1 volt at unity power factor (volt and ampere in phase). It is analogous to horsepower or foot-pound-per-minute of mechanical power. One horsepower is equivalent to approximately 746 watts.

Watt-hour (Wh): Equal to one watt of power supplied to, or taken from, an electric circuit steadily for one hour.

SOURCES: These definitions were compiled from the glossaries in the following U.S. Department of Energy, Energy Information Administration publications: *Coal Production* (EIA-0118), *Cost and Quality of Fuels for Electric Utility Plants* (EIA-0191), *Demonstrated Reserve Base of Coal in the United States on January 1, 1980* (EIA-0280), *Electric Power Annual* (EIA-0348), *Inventory of Power Plants in the United States* (EIA-0095), *Natural Gas Annual* (EIA-0131) and its predecessor publication, *Natural Gas Production and Consumption* (EIA-0131), *Petroleum Supply Monthly* (EIA-0109), and *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves* (EIA-0216).

The definition of average megawatt is from the Northwest Power Planning Council, *Northwest Conservation and Electric Power Plan*, volume 1, 1983.

ENERGY PRODUCTION AND CONSUMPTION

1

HIGHLIGHTS

- Total production of energy in Montana was 820 trillion British thermal units (Btu) in 1987, down 8 trillion Btu from 1986.

- Coal accounted for most (73 percent) of the total energy produced in Montana in 1987. The rest of the energy produced was in the form of crude oil (17 percent), natural gas (6 percent), and hydroelectric power (4 percent).

- Montanans consumed 320.8 trillion Btu of energy in 1987 (the latest year for which figures are available). This is 2 percent more energy than was consumed in 1986.

- Industry, including agriculture, represented the largest consuming sector. In 1987 industry consumed 38 percent of the energy sold in Montana. Transportation, almost exclusively in the form of petroleum products, accounted for 37 percent of the consumption. The residential and commercial sectors consumed 14 percent and 11 percent, respectively, of the energy sold in Montana.

TABLE 1.1
PRODUCTION OF ENERGY BY TYPE OF FUEL, 1960-87
(physical units)

Year	Subbituminous Coal (thousand tons)	Lignite Coal (thousand tons)	(Dry) Natural Gas (million cubic feet)	Crude Oil (thousand barrels)	Hydroelectric Power (million kWh)	Wood & Waste[1] (million kWh)
1960	113.000	200.000	35,381	30,240	5,801	NA
1961	97.000	274.000	34,884	30,906	6,499	0
1962	78.000	304.000	28,973	31,648	6,410	0
1963	53.000	290.000	27,113	30,870	6,011	0
1964	46.000	300.000	25,234	30,647	6,821	31
1965	63.000	301.000	27,873	32,778	8,389	37
1966	91.000	328.000	32,414	35,380	7,940	38
1967	65.000	300.000	31,619	34,959	8,703	56
1968	189.000	330.000	31,917	48,460	8,925	74
1969	722.000	308.000	41,229	43,954	9,447	61
1970	3,124.000	323.000	37,445	37,879	8,745	73
1971	6,737.000	327.000	38,137	34,599	9,595	60
1972	7,899.000	322.000	35,606	33,904	9,444	50
1973	10,411.000	314.000	58,896	34,620	7,517	48
1974	13,775.000	331.000	51,401	34,554	9,726	16
1975	21,620.000	520.000	44,546	32,844	9,560	14
1976	25,919.000	312.000	45,098	32,814	12,406	37
1977	27,091.013	302.426	48,181	32,680	8,460	46
1978	26,390.466	288.708	47,140	30,467	11,708	52
1979	32,148.549	305.143	53,888	29,957	10,344	52
1980	29,675.034	305.578	53,802	29,584	9,966	17
1981	33,127.167	204.492	50,073	30,813	11,324	34
1982	27,666.745	177.556	50,932	30,917	10,920	28
1983	28,453.741	206.543	52,426	29,665	11,561	39
1984	32,816.936	236.954	52,981	30,080	11,112	57
1985	32,928.229	212.654	54,151	29,934	10,175	60
1986	33,490.096	252.754	48,245	27,165	10,857	61
1987	34,086.795	290.264	47,845	25,104	8,925	49
1988	38,692.778	227.603				

[1] Used to generate electricity.

Note: Because data on some fuels are not available, total production of energy may be slightly understated.

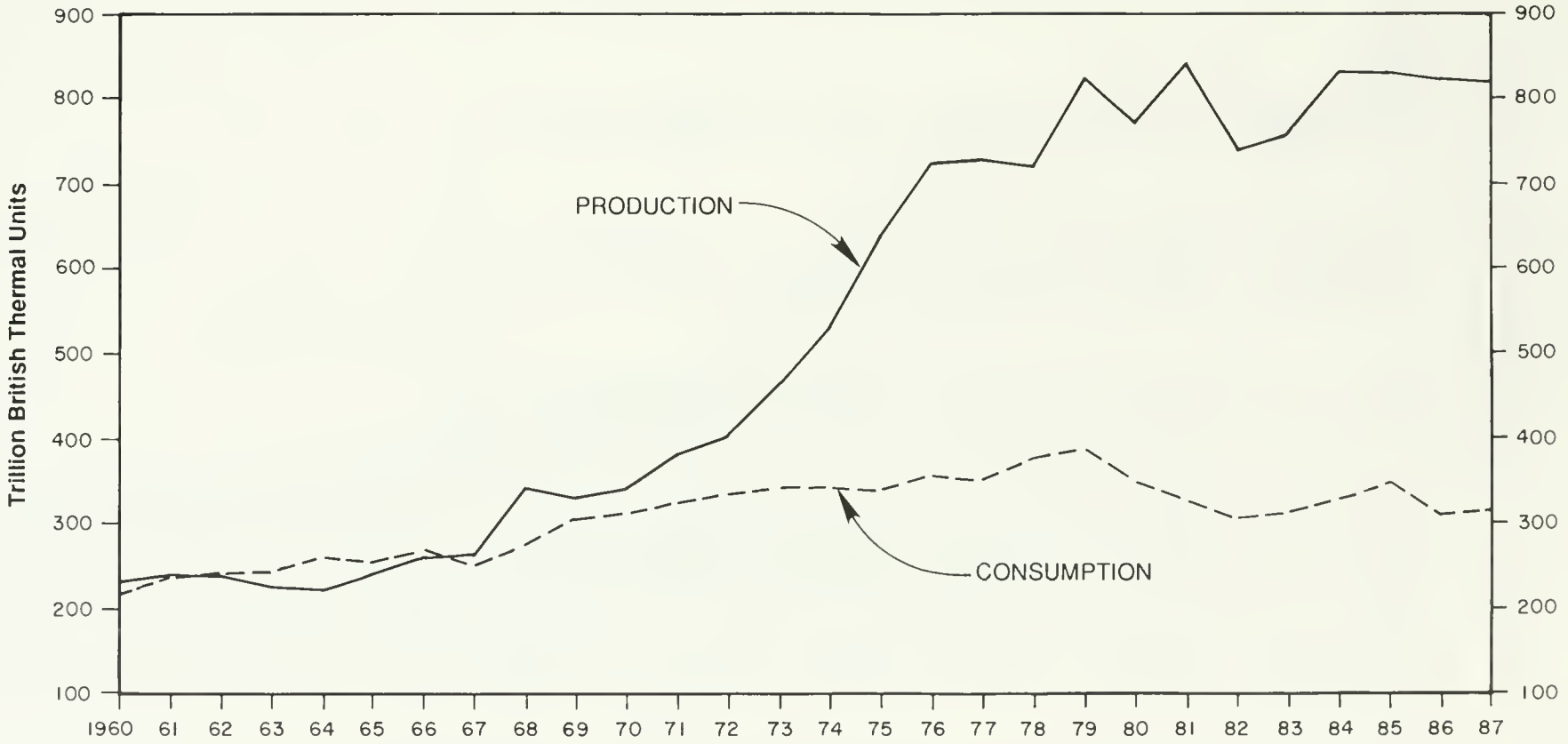
Source: Coal: U.S. Bureau of Mines (1960-76); Montana Energy Office (1977); Table 3.2 (1978-88).

Hydroelectric Power and Wood and Waste: Table 2.2 (1960-87).

Natural Gas: Table 4.2 (1960-87).

Crude Oil: Table 5.3 (1960-87).

FIGURE 1.1 PRODUCTION AND CONSUMPTION OF ENERGY, 1960-87



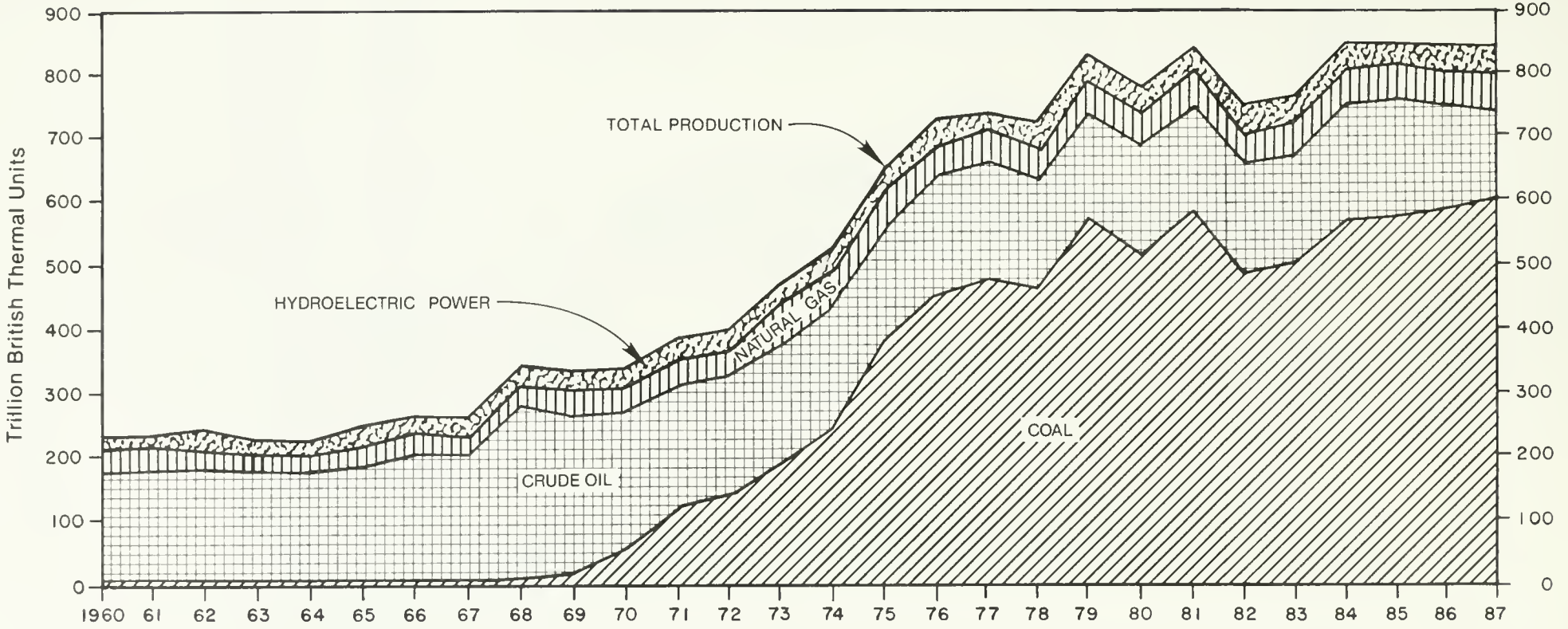
SOURCES: Production: Table 1.2
Consumption: Table 1.4

TABLE 1.2
PRODUCTION OF ENERGY BY TYPE OF FUEL, 1960-87
(trillion Btu)

Year	Subbituminous Coal	Lignite Coal	Coal Subtotal	(Dry) Natural Gas	Crude Oil	Hydroelectric Power	Wood & Waste	TOTAL
1960	1.978	2.600	4.578	35.381	169.646	19.793	NA	**229.398**
1961	1.698	3.562	5.260	34.884	173.383	22.174	0	**235.701**
1962	1.365	3.952	5.317	28.973	177.545	21.871	0	**233.706**
1963	0.928	3.770	4.698	27.113	173.181	20.510	0	**225.502**
1964	0.805	3.900	4.705	25.234	171.930	23.273	0.106	**225.248**
1965	1.102	3.913	5.015	27.873	183.884	28.623	0.126	**245.521**
1966	1.592	4.264	5.856	32.414	198.482	27.091	0.130	**263.973**
1967	1.138	3.900	5.038	31.619	196.120	26.695	0.191	**262.663**
1968	3.308	4.290	7.598	31.917	271.861	30.452	0.252	**342.080**
1969	12.635	4.004	16.639	41.229	246.582	32.233	0.208	**336.891**
1970	54.670	4.199	58.869	37.445	212.501	29.838	0.249	**338.902**
1971	117.898	4.251	122.149	38.137	194.100	32.738	0.205	**387.329**
1972	138.232	4.186	142.418	35.606	190.201	32.223	0.171	**400.619**
1973	182.192	4.082	186.274	58.896	194.218	25.648	0.164	**465.200**
1974	241.062	4.303	245.365	51.401	193.848	33.185	0.546	**524.345**
1975	378.350	6.760	385.110	44.546	184.255	32.619	0.478	**647.008**
1976	453.582	4.056	457.638	45.098	184.086	42.329	0.126	**729.277**
1977	474.093	3.932	478.025	48.181	183.335	28.866	0.157	**738.564**
1978	461.833	3.753	465.586	47.140	170.920	39.948	0.177	**723.771**
1979	562.600	3.967	566.567	53.888	168.059	35.294	0.177	**823.985**
1980	519.313	3.972	523.286	53.802	165.966	34.004	0.058	**777.116**
1981	579.725	2.658	582.384	50.073	172.861	38.637	0.116	**844.071**
1982	484.168	2.308	486.476	50.932	173.444	37.259	0.096	**748.207**
1983	497.940	2.685	500.626	52.426	166.421	39.446	0.133	**759.052**
1984	574.296	3.080	577.376	52.981	168.749	37.914	0.194	**837.214**
1985	576.244	2.764	579.008	54.151	167.930	34.717	0.205	**836.011**
1986	586.077	3.285	589.362	48.245	152.396	37.044	0.208	**827.255**
1987	596.519	3.773	600.292	47.845	140.833	30.452	0.167	**819.589**
1988	677.124	2.959						

NOTE: This table gives the Btu equivalents of the physical units shown in Table 1.1.

FIGURE 1.2 PRODUCTION OF ENERGY BY TYPE OF FUEL, 1960-87



NOTE: Wood and waste products used to generate electricity at electric utilities are not shown because their contribution is negligible.

SOURCE: Table 1.2.

TABLE 1.3
CONSUMPTION OF ENERGY BY TYPE OF FUEL, 1960-87
(physical units)

Year	Coal (thousand short tons)	Natural Gas (Dry) (billion cubic feet)	Petroleum (thousand barrels)	Hydroelectric Power (million kWh)	Wood and Waste[1] (million kWh)	Net Interstate Sales of Electricity/Losses[2] (million kWh)
1960	254	56	18,992	5,800	0	-3,180
1961	336	59	20,720	6,498	0	-5,279
1962	373	63	21,097	6,409	0	-5,281
1963	357	67	21,234	6,011	0	-3,343
1964	381	69	21,566	6,819	31	-4,126
1965	370	71	19,481	8,388	37	-6,938
1966	392	72	20,881	7,939	39	-3,166
1967	381	65	19,979	8,704	56	-5,785
1968	450	63	22,196	8,924	74	-4,126
1969	619	78	23,066	9,448	61	-2,553
1970	763	88	22,448	8,744	73	-1,251
1971	731	88	23,674	9,593	61	-2,593
1972	830	84	25,997	9,443	51	-2,370
1973	951	90	27,795	7,518	48	-368
1974	923	80	28,066	9,723	16	-2,577
1975	1,149	80	27,316	10,164	14	-6,056
1976	2,507	74	29,667	12,400	37	-16,027
1977	3,385	71	29,072	8,458	46	-8,415
1978	3,390	73	30,787	11,706	52	-14,798
1979	3,686	70	32,673	10,342	52	-11,859
1980	3,520	61	29,110	9,963	17	-11,327
1981	3,622	52	25,783	11,321	34	-15,153
1982	2,826	52	23,661	10,918	28	-11,688
1983	2,533	46	26,741	11,559	39	-14,133
1984	5,283	47	27,292	11,110	57	-21,339
1985	5,713	47	28,885	10,244	60	-19,464
1986	7,780	41	24,727	10,855	61	-31,837
1987	7,730	39	24,769	8,951	49	-23,895

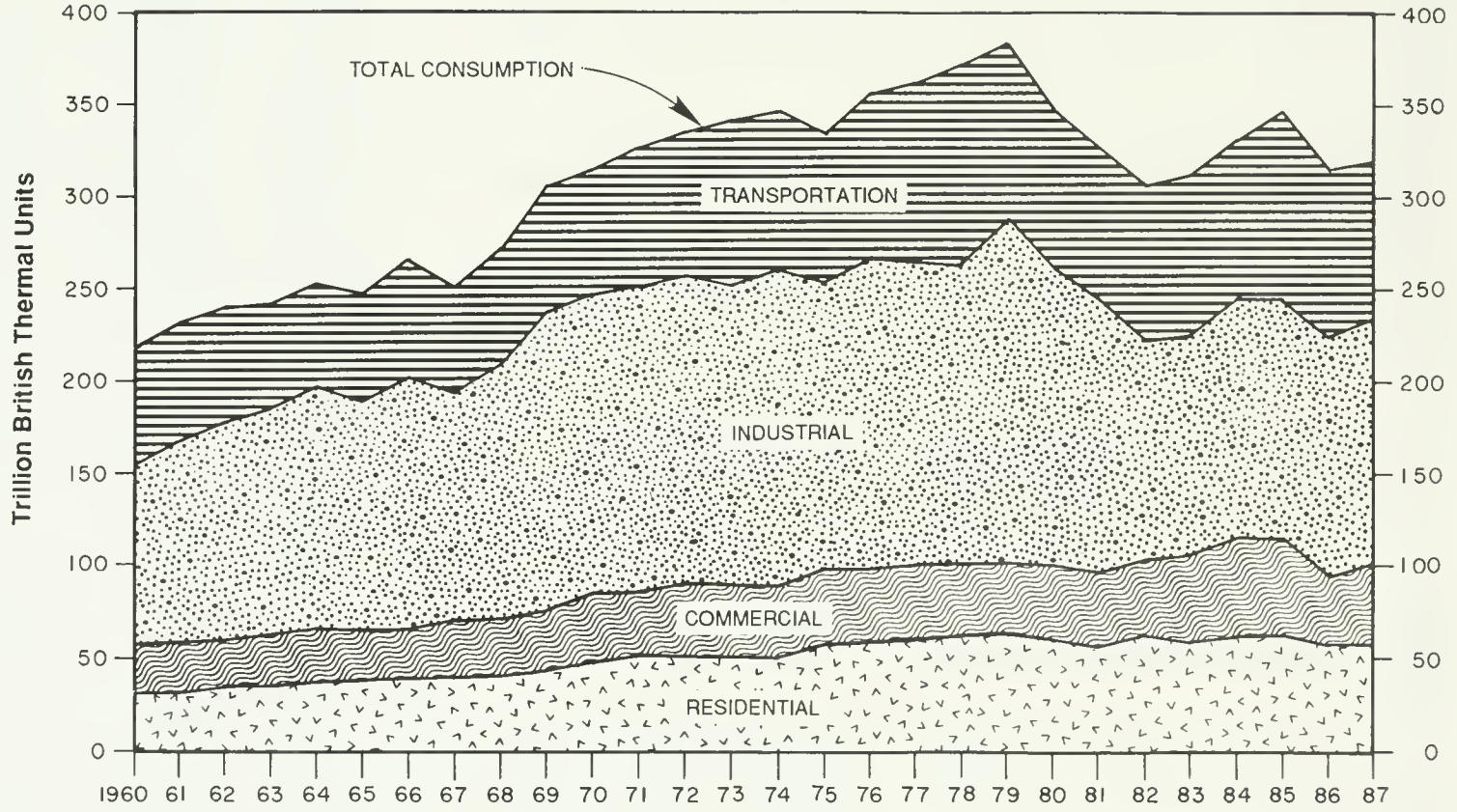
[1] Consumed at utilities to produce electricity.

[2] Net interstate sales of electricity is the difference between the amounts of energy in the electricity sold within a state (including associated losses) and the energy input at the electric utilities within the state. The net interstate sales, therefore, include associated electrical energy losses. A positive number indicates that more electricity (including associated losses) came into the state than went out of the state during the year. Conversely, a negative number indicates that more electricity (including associated losses) went out of the state than came into the state.

NOTE: Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report: 1960 through 1987* (EIA-0214).

FIGURE 1.3 CONSUMPTION OF ENERGY BY SECTOR, 1960-87



SOURCE: Tables 1.5 - 1.9

TABLE 1.4
CONSUMPTION OF ENERGY BY TYPE OF FUEL, 1960-87
(trillion Btu)

Year	Coal	Natural Gas (Dry)	Petroleum	Hydroelectric Power	Wood and Waste[1]	Net Interstate Sales of Electricity/Losses[2]	TOTAL
1960	4.0	57.6	106.4	62.4	0.0	-10.9	**219.6**
1961	5.1	61.3	116.2	69.2	0.0	-18.0	**233.8**
1962	5.7	65.7	119.1	67.7	0.0	-18.0	**240.1**
1963	5.4	66.6	120.0	63.0	0.0	-11.1	**243.9**
1964	5.8	69.5	121.9	71.3	0.3	-14.1	**254.7**
1965	5.5	70.8	108.9	87.7	0.4	-23.7	**249.6**
1966	5.8	72.1	116.7	82.7	0.4	-10.8	**266.9**
1967	5.5	64.9	110.2	90.8	0.6	-19.7	**252.2**
1968	6.7	62.8	123.0	92.8	0.8	-14.1	**272.0**
1969	9.6	78.2	128.0	98.7	0.6	-8.7	**306.5**
1970	12.0	90.6	124.8	91.8	0.8	-4.3	**315.7**
1971	11.5	91.1	131.6	100.5	0.6	-8.8	**326.5**
1972	13.2	87.0	144.4	98.0	0.5	-8.1	**335.1**
1973	15.2	93.1	154.9	78.1	0.5	-1.3	**340.7**
1974	14.7	81.7	156.8	101.5	0.2	-8.8	**346.1**
1975	18.6	81.2	152.3	105.8	0.1	-20.7	**337.4**
1976	42.2	75.4	165.8	128.6	0.4	-54.7	**357.7**
1977	57.8	71.6	162.6	88.3	0.5	-28.7	**352.0**
1978	57.6	72.7	170.8	121.3	0.5	-50.5	**372.4**
1979	63.4	69.1	185.4	107.1	0.5	-40.5	**385.1**
1980	60.2	61.5	162.7	103.5	0.2	-38.6	**349.4**
1981	62.5	53.0	144.4	118.3	0.4	-51.7	**327.0**
1982	48.6	52.8	130.8	114.1	0.3	-39.9	**306.8**
1983	42.8	46.6	148.5	121.6	0.4	-48.2	**311.7**
1984	90.3	47.1	152.5	114.7	0.6	-72.8	**332.4**
1985	99.1	47.3	160.7	105.9	0.6	-66.4	**347.2**
1986	133.3	41.1	137.3	111.4	0.6	-108.6	**315.1**
1987	132.9	39.6	137.0	92.4	0.5	-81.5	**320.8**

[1] Consumed at utilities to produce electricity.

[2] Net interstate sales of electricity is the difference between the amounts of energy in the electricity sold within a state (including associated losses) and the energy input at the electric utilities within the state. The net interstate sales, therefore, include associated electrical energy losses. A positive number indicates that more electricity (including associated losses) came into the state than went out of the state during the year. Conversely, a negative number indicates that more electricity (including associated losses) went out of the state than came into the state.

NOTE: This table gives the Btu equivalent of the physical units shown in Table 1.3. In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in an artificially high estimate of the amount of electrical energy consumed in Montana.

Does not include wood consumed by the nonutility sectors. Also excludes small quantities of other energy sources for which consistent historical data are not available, such as solar energy obtained by the use of thermal and photovoltaic collectors, wind energy, and geothermal, biomass, and waste energy other than that consumed at the electric utilities.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report: 1960 through 1987* (EIA-0214).

TABLE 1.5
CONSUMPTION OF ENERGY BY SECTOR, 1960-1987
(trillion Btu)

Year	Residential	Commercial	Industrial	Transportation	Net Consumption	Electrical System Losses[1]	TOTAL[2]
1960	24.5	20.5	77.7	58.1	180.8	38.7	**219.6**
1961	25.8	20.7	86.8	61.5	194.8	39.1	**233.8**
1962	25.7	20.7	92.9	60.2	199.5	40.5	**240.1**
1963	25.2	21.2	97.9	58.0	202.3	41.6	**243.9**
1964	27.4	23.4	101.3	57.7	209.8	45.1	**254.7**
1965	28.4	21.9	92.1	57.6	200.0	49.9	**249.6**
1966	28.9	21.3	98.1	62.0	210.3	56.5	**266.9**
1967	29.3	22.9	89.4	56.8	198.4	53.9	**252.2**
1968	30.0	21.3	98.5	61.6	211.4	60.6	**272.0**
1969	32.3	24.6	111.8	66.2	234.9	71.6	**306.5**
1970	35.7	27.3	112.2	68.1	243.3	72.3	**315.7**
1971	37.6	27.6	116.7	71.3	253.2	73.4	**326.5**
1972	37.2	29.3	119.2	75.9	261.6	73.4	**335.1**
1973	38.4	29.7	121.8	83.7	273.6	67.1	**340.7**
1974	35.5	27.1	121.8	85.4	269.8	76.3	**346.1**
1975	39.0	30.5	112.1	82.1	263.7	73.6	**337.4**
1976	39.0	30.1	118.9	88.3	276.3	81.5	**357.7**
1977	37.3	28.9	117.5	85.8	269.5	82.4	**362.0**
1978	40.9	30.8	113.1	97.5	282.3	90.1	**372.4**
1979	38.6	30.3	132.9	91.7	293.5	91.6	**385.1**
1980	35.0	24.8	110.9	88.9	259.6	89.8	**349.4**
1981	30.8	24.6	98.7	83.8	237.9	89.1	**327.0**
1982	35.8	26.5	79.6	80.8	222.7	84.2	**306.8**
1983	33.7	30.7	83.8	83.2	231.4	80.2	**311.7**
1984	34.6	32.4	88.7	85.3	241.0	91.3	**332.4**
1985	35.8	33.6	100.1	82.3	251.8	95.4	**347.2**
1986	32.3	25.4	83.6	82.2	223.5	91.7	**315.1**
1987	31.4	23.9	84.5	82.5	222.3	98.4	**320.8**

[1] Incurred in the generation, transmission, and distribution of electricity plus plant use and unaccounted for electrical system energy losses.

[2] Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

NOTE: In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in an artificially high estimate of the amount of electrical energy consumed in Montana.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report,* 1960-87 (EIA-0214).

TABLE 1.6
RESIDENTIAL ENERGY CONSUMPTION ESTIMATES, 1960-87

	COAL		NATURAL GAS[1]		PETROLEUM		ELECTRICITY		NET CONSUMPTION	ELECTRICAL SYSTEM LOSSES[2]		TOTAL[3]
YEAR	TBtu	Mtons	TBtu	Bcf	TBtu	Mbbl	TBtu	GWh	TBtu	TBTU	GWh	Btu
1960	0.2	11	17.5	17	3.6	768	3.2	935	24.5	7.9	2,327	**32.4**
1961	0.2	10	17.8	17	4.4	951	3.4	982	25.8	8.2	2,393	**33.9**
1962	0.2	10	17.8	17	4.2	895	3.6	1,041	25.7	8.5	2,504	**34.3**
1963	0.2	9	17.4	17	3.9	827	3.7	1,077	25.2	8.8	2,577	**34.0**
1964	0.2	9	18.9	19	4.4	967	3.9	1,139	27.4	9.3	2,712	**36.7**
1965	0.2	8	19.9	20	4.2	914	4.1	1,216	28.4	9.9	2,904	**38.3**
1966	0.2	8	19.7	20	4.7	1,043	4.3	1,261	28.9	10.3	3,026	**39.2**
1967	0.2	9	19.7	20	5.0	1,191	4.4	1,291	29.3	10.5	3,083	**39.8**
1968	0.1	7	19.7	20	5.5	1,318	4.7	1,373	30.0	11.2	3,277	**41.2**
1969	0.1	6	21.4	21	5.8	1,361	5.0	1,462	32.3	11.9	3,493	**44.2**
1970	0.1	4	25.6	25	4.8	1,137	5.2	1,534	35.7	12.7	3,717	**48.4**
1971	0.1	7	26.2	25	5.7	1,302	5.6	1,633	37.6	13.5	3,947	**51.1**
1972	0.1	4	24.5	24	6.7	1,531	6.0	1,757	37.2	14.4	4,229	**51.7**
1973	0.1	5	25.6	25	6.5	1,460	6.2	1,812	38.4	14.8	4,339	**53.2**
1974	0.1	4	22.0	22	7.0	1,569	6.4	1,873	35.5	15.6	4,566	**51.1**
1975	0.1	4	24.6	24	7.0	1,562	7.3	2,143	39.0	17.6	5,169	**56.6**
1976	0.1	3	23.8	24	7.5	1,640	7.7	2,261	39.0	18.6	5,446	**57.6**
1977	*	1	21.7	22	7.2	1,609	8.3	2,440	37.3	20.1	5,891	**57.4**
1978	0.1	6	22.9	23	8.5	1,933	9.4	2,754	40.9	23.0	6,738	**63.9**
1979	0.1	4	22.3	23	6.2	1,280	10.1	2,957	38.6	24.3	7,136	**63.0**
1980	0.1	5	19.5	19	5.5	1,250	9.9	2,916	35.0	24.2	7,091	**59.2**
1981	*	3	17.4	17	3.4	777	9.9	2,906	30.8	23.6	6,926	**54.4**
1982	0.1	3	20.2	20	4.7	1,088	10.8	3,178	35.8	26.0	7,633	**61.8**
1983	0.1	3	17.1	17	6.0	1,365	10.6	3,097	33.7	25.3	7,419	**59.0**
1984	*	2	18.5	18	4.5	954	11.6	3,386	34.6	27.0	7,899	**61.5**
1985	*	3	19.4	19	4.5	1,026	12.0	3,505	35.8	28.3	8,291	**64.1**
1986	0.1	8	16.8	17	4.5	1,029	10.9	3,181	32.3	25.2	7,372	**57.5**
1987	*	3	15.6	15	4.0	938	11.7	3,437	31.4	26.8	7,863	**58.2**

[1] Includes supplemental gaseous fuels.

[2] Incurred in the generation, transmission, and distribution of electricity plus plant use and unaccounted for electrical system energy losses.

[3] Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

* Btu value less than 0.05, and physical unit value less than 0.5.

NOTE: In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in an artificially high estimate of the amount of electrical energy consumed in Montana.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report*, 1960-87 (EIA-0214).

TABLE 1.7
COMMERCIAL ENERGY CONSUMPTION ESTIMATES, 1960-87

	COAL		NATURAL GAS[1]		PETROLEUM		ELECTRICITY		NET CONSUMPTION	ELECTRICAL SYSTEM LOSSES[2]		TOTAL[3]
YEAR	TBtu	Mtons	TBtu	Bcf	TBtu	Mbbl	TBtu	GWh	TBtu	TBtu	GWh	TBtu
1960	0.4	20	12.3	12	5.5	989	2.3	688	20.5	5.8	1,711	26.4
1961	0.4	18	12.6	12	5.2	944	2.5	740	20.7	6.2	1,804	26.9
1962	0.4	19	12.8	12	4.8	866	2.7	789	20.7	6.5	1,896	27.1
1963	0.4	18	12.6	13	5.3	960	2.8	833	21.2	6.8	1,991	27.9
1964	0.4	17	13.1	13	6.9	1,255	2.9	858	23.4	7.0	2,044	30.3
1965	0.3	15	14.1	14	4.3	800	3.2	925	21.9	7.5	2,208	29.5
1966	0.3	15	14.1	14	3.5	662	3.4	986	21.3	8.1	2,366	29.4
1967	0.3	16	15.5	16	3.6	691	3.5	1,039	22.9	8.5	2,483	31.4
1968	0.3	12	13.6	14	3.7	717	3.7	1,078	21.3	8.8	2,572	30.1
1969	0.2	11	16.6	17	4.0	759	3.8	1,111	24.6	9.1	2,653	33.6
1970	0.2	8	19.2	19	3.9	755	4.1	1,187	27.3	9.8	2,877	37.1
1971	0.3	12	18.7	18	4.3	817	4.3	1,258	27.6	10.4	3,042	38.0
1972	0.2	8	19.7	19	4.9	935	4.5	1,322	29.3	10.9	3,182	40.2
1973	0.2	9	19.7	19	5.1	953	4.7	1,371	29.7	11.2	3,282	40.9
1974	0.2	8	16.9	17	5.3	988	4.7	1,370	27.1	11.4	3,340	38.5
1975	0.1	7	19.0	19	5.8	1,071	5.6	1,645	30.5	13.5	3,968	44.1
1976	0.1	6	18.1	18	6.0	1,116	5.9	1,728	30.1	14.2	4,163	44.3
1977	*	2	16.8	17	5.9	1,086	6.2	1,814	28.9	14.9	4,381	43.8
1978	0.2	10	17.7	18	6.3	1,188	6.6	1,926	30.8	16.1	4,712	46.9
1979	0.1	7	17.2	17	6.0	1,080	7.0	2,061	30.3	17.0	4,974	47.3
1980	0.2	9	14.4	14	3.1	591	7.1	2,094	24.8	17.4	5,092	42.2
1981	0.1	5	13.8	14	3.1	579	7.5	2,202	24.6	17.9	5,247	42.5
1982	0.1	6	16.1	16	2.2	445	8.0	2,339	26.5	19.2	5,618	45.6
1983	0.1	5	13.6	14	8.5	1,511	8.5	2,499	30.7	20.4	5,988	51.2
1984	0.1	4	14.3	14	8.3	1,450	9.7	2,852	32.4	22.7	6,653	55.1
1985	0.1	5	14.8	15	9.5	1,634	9.2	2,694	33.6	21.7	6,372	55.3
1986	0.3	14	12.5	13	4.2	759	8.4	2,463	25.4	19.5	5,707	44.8
1987	0.1	5	11.2	11	3.1	584	9.5	2,795	23.9	21.8	6,394	45.8

[1] Includes supplemental gaseous fuels.

[2] Incurred in the generation, transmission, and distribution of electricity plus plant use and unaccounted for electrical system energy losses.

[3] Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

* Btu value less than 0.05, and physical unit value less than 0.5.

NOTE: In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in an artificially high estimate of the amount of electrical energy consumed in Montana.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report*, 1960-87 (EIA-0214).

TABLE 1.8
INDUSTRIAL ENERGY CONSUMPTION ESTIMATES, 1960-87

	COAL		NATURAL GAS[1]		PETROLEUM		ELECTRICITY		NET CONSUMPTION	ELECTRICAL SYSTEM LOSSES[2]		TOTAL[3]
YEAR	TBtu	Mtons	TBtu	Bcf	TBtu	Mbbl	TBtu	GWh	TBtu	TBtu	GWh	TBtu
1960	0.8	36	27.0	26	39.8	6,647	10.1	2,951	77.7	25.0	7,341	**102.7**
1961	1.0	45	29.2	28	46.4	7,757	10.1	2,973	86.8	24.7	7,247	**111.5**
1962	1.1	49	29.9	29	51.2	8,513	10.6	3,114	92.9	25.5	7,486	**118.4**
1963	1.0	44	32.0	32	54.0	8,993	10.9	3,191	97.9	26.0	7,631	**124.0**
1964	1.4	62	33.7	34	54.1	8,977	12.1	3,544	101.3	28.8	8,440	**130.1**
1965	1.2	52	34.3	34	43.2	7,255	13.4	3,939	92.1	32.1	9,406	**124.2**
1966	1.0	45	34.9	35	46.3	7,791	15.9	4,657	98.1	38.1	11,174	**136.3**
1967	0.7	31	28.4	28	45.6	7,741	14.6	4,282	89.4	34.9	10,230	**124.3**
1968	0.7	32	28.3	28	52.5	8,851	17.0	4,982	98.5	40.6	11,887	**139.1**
1969	0.6	25	38.1	38	52.0	8,738	21.2	6,208	111.8	50.6	14,830	**162.4**
1970	0.6	28	42.5	41	48.5	8,107	20.6	6,029	112.2	49.8	14,610	**162.1**
1971	0.8	40	44.3	43	51.1	8,549	20.5	5,999	116.7	49.5	14,504	**166.2**
1972	1.0	49	40.3	39	57.9	9,699	20.0	5,858	119.2	48.1	14,101	**167.3**
1973	0.9	44	43.4	42	60.3	10,078	17.2	5,034	121.8	41.1	12,051	**162.9**
1974	1.2	56	39.7	39	60.8	10,108	20.2	5,929	121.8	49.3	14,456	**171.2**
1975	1.0	50	34.6	34	58.9	9,853	17.6	5,160	112.1	42.5	12,447	**154.6**
1976	2.4	124	31.2	31	65.0	10,843	20.2	5,922	118.9	48.7	14,264	**167.5**
1977	3.5	186	30.4	30	63.9	10,660	19.7	5,759	117.5	47.4	13,907	**164.9**
1978	3.5	190	29.4	29	59.4	9,876	20.8	6,106	113.1	51.0	14,938	**164.1**
1979	4.2	213	24.9	25	83.0	13,763	20.9	6,111	132.9	50.3	14,748	**183.2**
1980	2.9	154	20.3	20	67.8	11,426	19.8	5,815	110.9	48.2	14,140	**159.1**
1981	5.4	276	17.5	17	56.0	9,314	20.0	5,848	98.7	47.6	13,938	**146.3**
1982	4.3	222	13.7	14	45.3	7,644	16.2	4,759	79.6	39.0	11,431	**118.6**
1983	3.3	169	13.9	14	52.3	8,804	14.4	4,217	83.8	34.5	10,103	**118.3**
1984	3.1	164	12.0	12	55.8	9,468	17.8	5,229	88.7	41.7	12,198	**130.4**
1985	4.1	225	10.3	10	66.5	11,465	19.2	5,623	100.1	45.4	13,303	**145.5**
1986	5.7	320	9.3	9	48.3	8,154	20.3	5,948	83.6	47.0	13,782	**130.6**
1987	3.4	192	10.1	10	49.2	8,399	21.8	6,384	84.5	49.8	14,664	**134.4**

[1] Includes supplemental gaseous fuels.

[2] Incurred in the generation, transmission, and distribution of electricity plus plant use and unaccounted for electrical system energy losses.

[3] Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

* Btu value less than 0.05, and physical unit value less than 0.5.

NOTE: In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in an artificially high estimate of the amount of electrical energy consumed in Montana.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report*, 1960-87 (EIA-0214).

TABLE 1.9
TRANSPORTATION ENERGY CONSUMPTION ESTIMATES, 1960-87

	COAL		NATURAL GAS[1]		PETROLEUM		NET CONSUMPTION	ELECTRICAL SYSTEM LOSSES[2]		TOTAL[3]
YEAR	TBtu	Mtons	TBtu	Bcf	TBtu	Mbbl	TBtu	TBtu	GWh	TBtu
1960	*	1	0.5	*	57.5	10,589	58.1	0.0	0	**58.1**
1961	*	*	1.4	1	60.2	11,068	61.5	0.0	0	**61.5**
1962	*	*	1.3	1	58.9	10,822	60.2	0.0	0	**60.2**
1963	*	*	1.2	1	56.8	10,453	58.0	0.0	0	**58.0**
1964	*	*	1.3	1	56.4	10,363	57.7	0.0	0	**57.7**
1965	*	*	0.4	*	57.2	10,513	57.6	0.0	0	**57.6**
1966	*	*	0.4	*	61.6	11,303	62.0	0.0	0	**62.0**
1967	*	*	0.8	1	56.0	10,350	56.8	0.0	0	**56.8**
1968	*	*	0.6	1	61.1	11,286	61.6	0.0	0	**61.6**
1969	*	*	0.6	1	65.6	12,103	66.2	0.0	0	**66.2**
1970	*	*	0.7	1	67.4	12,423	68.1	0.0	0	**68.1**
1971	*	*	0.8	1	70.5	13,005	71.3	0.0	0	**71.3**
1972	*	*	1.1	1	74.8	13,815	75.9	0.0	0	**75.9**
1973	*	*	1.7	2	82.0	15,135	83.7	0.0	0	**83.7**
1974	*	*	1.8	2	83.7	15,387	85.4	0.0	0	**85.4**
1975	*	*	1.8	2	80.3	14,776	82.1	0.0	0	**82.1**
1976	*	*	1.5	1	86.8	15,987	88.3	0.0	0	**88.3**
1977	*	*	1.5	1	84.3	15,522	85.8	0.0	0	**85.8**
1978	0	0	1.5	2	95.9	17,692	97.5	0.0	0	**97.5**
1979	0	0	2.3	2	89.4	16,403	91.7	0.0	0	**91.7**
1980	0	0	2.9	3	86.0	15,786	88.9	0.0	0	**88.9**
1981	0	0	2.1	2	81.7	15,075	83.8	0.0	0	**83.8**
1982	0	0	2.3	2	78.4	14,454	80.8	0.0	0	**80.8**
1983	0	0	1.7	2	81.6	15,031	83.2	0.0	0	**83.2**
1984	0	0	1.9	2	83.5	15,341	85.3	0.0	0	**85.3**
1985	0	0	2.2	2	80.0	14,721	82.3	0.0	0	**82.3**
1986	0	0	2.1	2	80.2	14,760	82.2	0.0	0	**82.2**
1987	0	0	2.0	2	80.4	14,804	82.5	0.0	0	**82.5**

[1] Includes supplemental gaseous fuels.

[2] Incurred in the generation, transmission, and distribution of electricity plus plant use and unaccounted for electrical system energy losses.

[3] Due to the lack of consistent historical data, statistics exclude wood, waste, geothermal, wind, photovoltaic, and solar thermal energy (except for small amounts used by electric utilities to generate electricity for distribution).

* Btu value less than 0.05, and physical unit value less than 0.5.

NOTE: In the source document, DOE uses fossil fuel equivalent conversion factors to convert kilowatt-hours of hydroelectric generation to British thermal units. The reader is cautioned that much of the electricity generated in Montana is produced at hydroelectric plants. Therefore, DNRC feels that the use of these conversion factors may result in an artificially high estimate of the amount of electrical energy consumed in Montana.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report*, 1960-87 (EIA-0214).

ELECTRICITY

2

HIGHLIGHTS

- With the beginning of commercial operation of the fourth Colstrip unit in 1985, total electric generating capacity in Montana jumped to 4,704 megawatts of which 49 percent is hydroelectric generating capacity and 51 percent is fossil fuel fired.

- Hydroelectric and fossil fuel plants generated 20.9 billion kWh in 1987, down 7 percent from the record high generation of 22.4 billion kWh in 1986.

- Montana's coal-fired plants produced 11.8 billion kWh of electricity in 1987, up 3 percent from the previous year.

- Electric utilities sold 12.6 billion kWh of electricity in Montana in 1987. Preliminary estimates show residential customers paid an average of 5.23 cents per kilowatt-hour, commercial customers paid an average of 4.68 cents per kilowatt-hour, and industrial customers paid an average of 2.72 cents per kilowatt-hour.

- In early 1988, the average Montana household consuming 1,000 kilowatt-hours of electricity per month paid $57.88, while the average U.S. household paid $74.15 for 1,000 kilowatt-hours of electricity.

TABLE 2.1
ELECTRIC POWER PLANTS BY PRIMARY FUEL, 1989

HYDROELECTRIC PLANTS

Owner/Operator	Plant	County	Initial Year of Operation (First Unit)	CAPABILITY Capacity[1] (megawatts)	CAPABILITY Critical Water Year (average MW)	CAPABILITY Median Water Year (average MW)
Champion International Corp.	Lake Creek	Lincoln	1916	5.0	2.3	2.8
Montana Department of Natural Resources and Conservation	Broadwater	Broadwater	1989	10.0	6.2	7.1
Montana Power Company	Black Eagle	Cascade	1927	18.0	14.0	18.0
Montana Power Company	Cochrane	Cascade	1958	50.0	22.0	34.0
Montana Power Company	Flint Creek	Granite	1901	1.1	1.0	1.0
Montana Power Company	Hauser Lake	Lewis & Clark	1907	16.5	12.0	16.0
Montana Power Company	Holter	Lewis & Clark	1918	49.0	24.0	30.0
Montana Power Company	Kerr	Lake	1938	180.0	119.0	128.0
Montana Power Company	Milltown	Missoula	1906	3.4	2.0	2.0
Montana Power Company	Morony	Cascade	1930	47.0	25.0	36.0
Montana Power Company	Mystic Lake	Stillwater	1925	11.5	6.0	6.0
Montana Power Company	Rainbow	Cascade	1910	35.0	29.0	35.0
Montana Power Company	Ryan	Cascade	1915	60.0	41.0	56.0
Montana Power Company	Thompson Falls	Sanders	1915	40.0	35.0	34.0
Montana Power Company	Madison	Madison	1906	8.5	7.0	8.0
Pacific Power & Light Co.	Bigfork	Flathead	1910	4.0	3.0	3.5
U.S. Dept. of the Army, North Pacific Division Corps of Engineers	Libby	Lincoln	1975	525.0	180.0	220.0
U.S. Dept. of the Army, Missouri River Division, Corps of Engineers	Fort Peck	McCone	1943	185.0	83.0	119.0
Mission Valley Power Co.	Hell Roaring	Lake	1915	0.4	NA	NA
U.S. Dept. of the Interior, Bureau of Reclamation, Great Plains Region	Canyon Ferry	Lewis & Clark	1953	50.0	30.4	45.9
U.S. Dept. of the Interior, Bureau of Reclamation, Great Plains Region	Yellowtail	Big Horn	1966	250.0	60.3	103.9
U.S. Dept. of the Interior, Bureau of Reclamation, Pacific Northwest Region	Hungry Horse	Flathead	1952	285.0	96.0	108.0
Washington Water Power Co.	Noxon Rapids	Sanders	1959	467.0	152.0	215.0
TOTAL HYDROELECTRIC CAPABILITY				**2,301.4 megawatts**		

TABLE 2.1 (continued)

FOSSIL FUEL FIRED PLANTS

Owner/Operator	Plant	County	Initial Year of Operation (First Unit)	CAPABILITY Capacity[1] (megawatts)	CAPABILITY Average (average MW)	Fuel
Montana-Dakota Utilities	Glendive	Dawson	1979	34.8		natural gas; #2 fuel oil
Montana-Dakota Utilities	Lewis & Clark	Richland	1958	50.9		lignite
Montana-Dakota Utilities	Miles City	Custer	1972	24.2		natural gas; #2 fuel oil
Montana Power Company	Frank Bird	Yellowstone	1951	60.0	3.0	oil; natural gas
Montana Power Company	J.E. Corette	Yellowstone	1968	156.0	125.0	subbituminous coal
Montana Power Company and Puget Sound Power & Light	Colstrip I	Rosebud	1975	314.0	245.0	subbituminous coal
Montana Power Company, Puget Sound Power & Light	Colstrip II	Rosebud	1976	320.0	246.0	subbituminous coal
Montana Power Company Puget Sound Power & Light, Portland General Electric, Washington Water Power, and Pacific Power & Light	Colstrip III	Rosebud	1984	720.0	562.0	subbituminous coal
Montana Power Company Puget Sound Power & Light, Portland General Electric, Washington Water Power, and Pacific Power & Light	Colstrip IV	Rosebud	1985	720.0	562.0	subbituminous coal
TOTAL FOSSIL FUEL FIRED CAPABILITY				**2,399.9 megawatts**		

OTHER PLANTS

Owner/Operator	Plant	County	Initial Year of Operation (First Unit)	CAPABILITY Capacity[1] (megawatts)	CAPABILITY Average (average MW)	Fuel
Champion International Corp.	Libby	Lincoln	1939	12.5	7.6	wood and waste products
TOTAL CAPABILITY OF OTHER PLANTS				**12.5**		
TOTAL MONTANA GENERATING CAPABILITY				**4,713.8 megawatts**		

[1] Unless otherwise specified, capacity denotes installed nameplate capacity.

TABLE 2.1 (continued)

NOTES: **Champion International Corporation** (formerly Montana Light and Power Co.): The average generation figure for the thermal generating units at Libby is a twelve-year average based on operating 365 days per year, 24 hours per day during that period. Generation is largely for in-plant use at Champion International.

U.S. Department of the Army, Missouri River Division, Corps of Engineers: Figures are based on the 08-83-1980 Reservoir Control Study (RCC). Fort Peck's dependable capacity (183 MW) is the load-carrying ability of the power plant based on the eighth year (1961) of drought drawdown (from RCC study 08-83-1980). The nameplate capacity (185 MW) is the total electrical rating of the generators and does not depend on adverse hydrologic conditions as does dependable capacity.

U.S. Department of the Army, North Pacific Division, Corps of Engineers: the present nameplate installed capacity at Libby is 525 MW based on the five existing units. The units at Libby have been designed to operate at 15 percent overload to provide maximum output during periods of high power demand. Thus, under certain conditions, when the reservoir level is between elevation 2,459 feet (full) and elevation 2,411 feet, Libby now can generate 604 MW.

The dependable capacity, defined as the maximum January output during adverse streamflow conditions, is 353 MW. Dependable capacity is used in load-resources planning studies to measure a project's or system's capability to meet winter peak demand. January has historically been the month when maximum power demand occurs. Adverse conditions are defined as the worst single year in the 40-year period of record from 1929-68 conventionally used by Northwest utilities. The water year 1936-37 had the worst streamflows and lowest generation capability in the period of record; this year is used to model dependable capacity.

U.S. Department of the Interior, Bureau of Reclamation, Great Plains Region: For planning purposes, the eastern and western marketing regions can count on receiving up to a maximum of 125 MW each from the Yellowtail Dam.

U.S. Department of the Interior, Bureau of Reclamation, Pacific Northwest Region: Although the nameplate capacity is 285 MW, the power plant is actually run at 328 MW. The Bureau of Reclamation expects to complete a rewind in 1993; the capacity will then be 448 MW.

The Bureau of Reclamation office reports a critical period generation of 96.0 average megawatts rather than a critical year figure for the Hungry Horse Dam, and the office reports a 40-year (1928-68) average generation of 108.0 average megawatts rather than a median water year figure.

Washington Water Power Co.: Energy generation for the critical water period assumes optimal coordinated operation of the reservoirs in the Northwest under streamflow and runoff conditions similar to those experienced during the four-year critical period from September 1928 through February 1932, the worst period on record. The maximum generating capacity is 554.0 MW; this is the peak output of the project with the reservoir full. Changes in reservoir elevation will affect the peak generating output.

Montana-Dakota Utilities: MDU prefers to use Uniform Rating of Generating Equipment (URGE) capacity ratings instead of nameplate capacities. URGE ratings are a generally accepted industry standard. URGE is a demonstrable and repeatable test for determining capacity ratings. Such ratings should be considered to be net maximum ratings.

The URGE capability test is an annual event. For this reason, URGE ratings may vary slightly from year to year. As a general rule of thumb, once a capability is established, it will remain essentially the same until operating procedures, upgrades, deratings, or some other such events change the rating.

MDU prefers to use a 1988 average generation figure determined by dividing the net total generation for 1988 by the total number of hours on-line. This computation results in the following figures:

Unit	Average Generation, 1988 (average MW/hour on-line)
Glendive	23.2
Lewis & Clark	27.0
Miles City	7.9

The Glendive and the Miles City units function as standby, emergency generation or peaking units.

Montana Power Company: MPC's energy and peak planning values represent net generating capabilities after maintenance.

Montana Power Company: The Frank Bird plant operates as a peaking unit. The Frank Bird plant's capacity is 60 MW net and the J.E. Corrette plant's capacity is 156 MW net. The annual energy generation at the J.E. Corrette plant is 125 average MW.

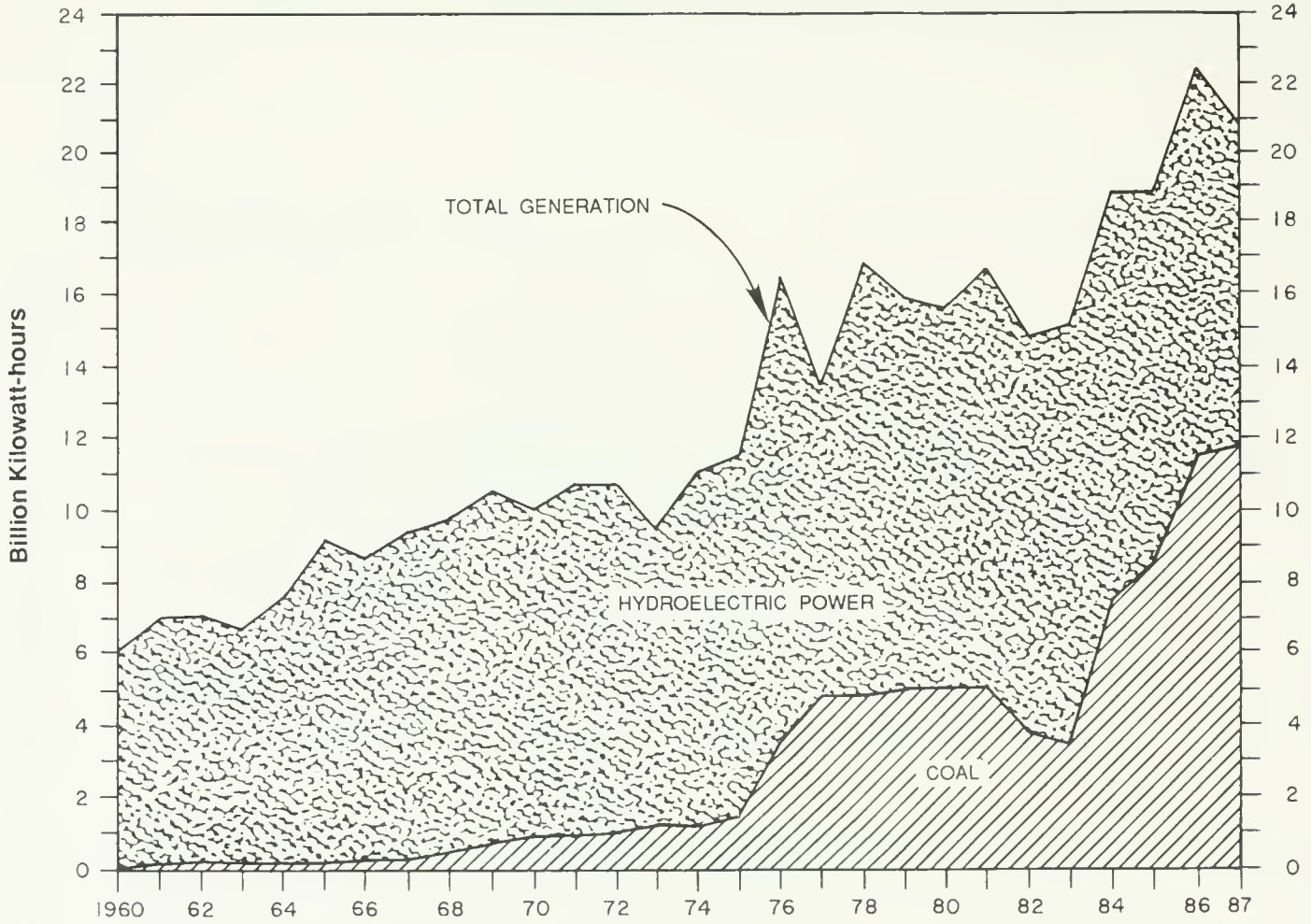
Montana Power Company and Puget Sound Power and Light: Colstrip units 1 and 2 have a 634 MW net capacity and a 491 average MW annual energy generation.

Montana Power Company, et al: Colstrip units 3 and 4 have a net capacity of 1440 MW and an estimated annual energy generation of 1124 average MW. MPC's share of Colstrip 4 is not used to serve its utility customers but has been sold off-system on long-term contracts.

Montana Power Company: In 1989, MPC was reviewing the generating capability of its Missouri River hydroelectric facilities.

SOURCES: Personal communications with the utilities and government agencies operating each power plant.

FIGURE 2.1 ANNUAL GENERATION OF ELECTRICITY, 1960-87



NOTE: Other fuel (Oil, Natural Gas, Wood and Waste) used to generate electricity are not shown because their contribution is negligible.

SOURCE: Table 2.2

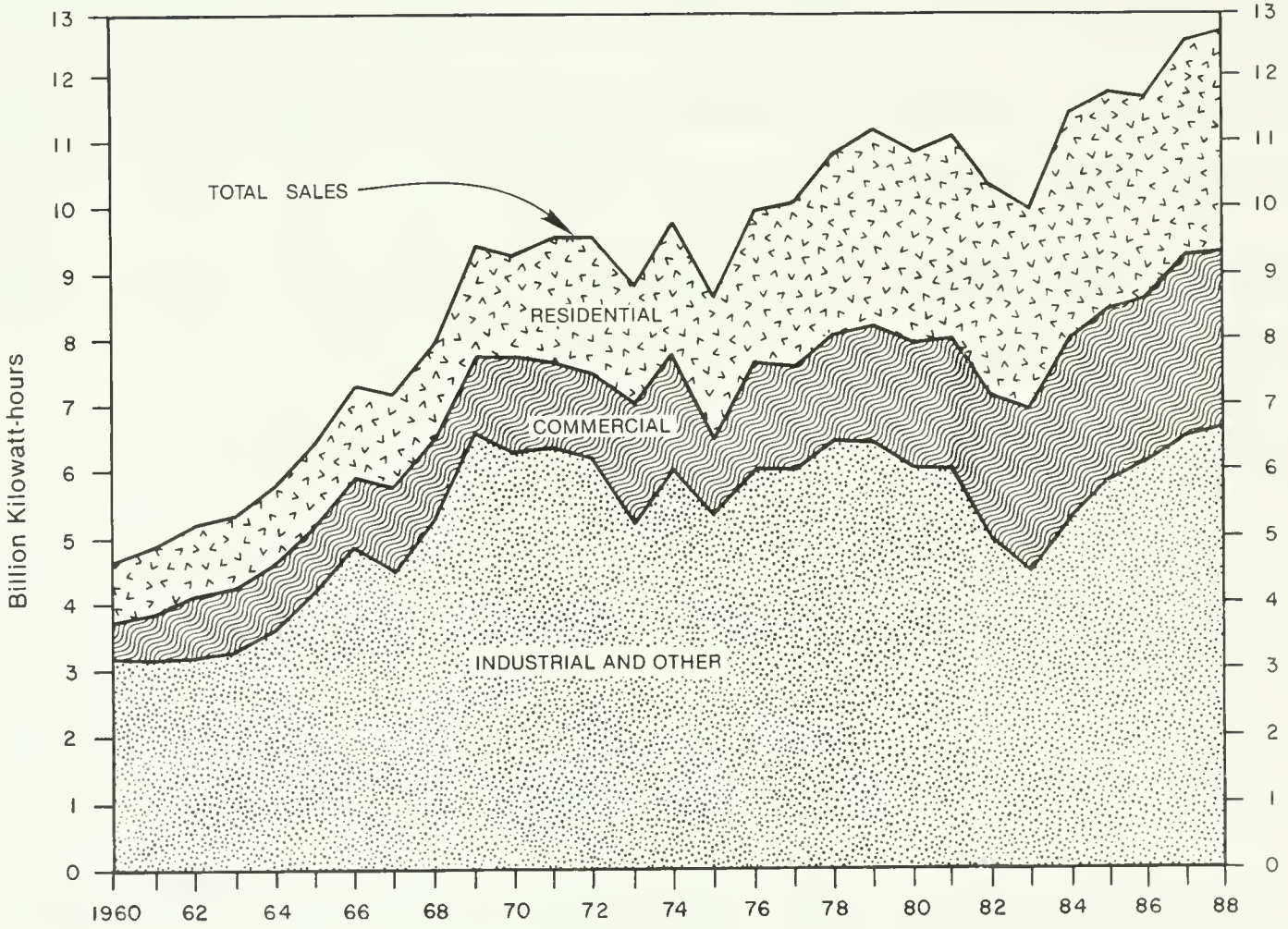
TABLE 2.2
NET ELECTRIC ENERGY GENERATION[1] BY TYPE OF FUEL UNIT, 1950-87

Year	TOTAL	HYDROELECTRIC		COAL		OIL		NATURAL GAS		WOOD AND WASTE	
	Million kWh Generated	Million kWh Generated	% of State Total	Million kWh Generated	% of State Total	Million kWh Generated	% of State Total	Million kWh Generated	% of State Total	Million kWh Generated	% of State Total
1950	3,136	3,107	99	NA		NA		NA		NA	
1951	3,304	3,259	99	NA		NA		NA		NA	
1952	3,778	3,464	92	NA		NA		NA		NA	
1953	3,719	3,424	92	NA		NA		NA		NA	
1954	4,274	4,246	99	NA		NA		NA		NA	
1955	4,696	4,679	99	NA		NA		NA		NA	
1956	5,495	5,459	99	NA		NA		NA		NA	
1957	5,215	4,969	95	NA		NA		NA		NA	
1958	4,551	4,224	93	NA		NA		NA		NA	
1959	4,934	4,720	96	NA		NA		NA		NA	
1960	5,992	5,801	97	NA		NA		NA		NA	
1961	6,780	6,499	96	263	4	0	0	19		0	0
1962	7,051	6,410	91	291	4	1	[2]	349	5	0	0
1963	6,594	6,011	91	284	4	0	0	299	5	0	0
1964	7,360	6,821	93	286	4	2	[2]	220	3	31	[2]
1965	8,882	8,389	94	285	3	0	0	171	2	37	[2]
1966	8,611	7,940	92	317	4	43	[2]	273	3	38	[2]
1967	9,117	8,703	95	314	3	3	[2]	41	[2]	56	1
1968	9,495	8,925	94	434	5	10	[2]	52	[2]	74	1
1969	10,442	9,447	90	735	7	52	[2]	147	1	61	1
1970	10,026	8,745	87	966	10	14	[2]	228	2	73	1
1971	10,653	9,595	90	901	8	1	[2]	96	1	60	1
1972	10,689	9,444	88	1,079	10	7	[2]	108	1	50	[2]
1973	9,132	7,517	82	1,303	14	69	[2]	195	2	48	1
1974	11,056	9,726	88	1,210	11	6	[2]	98	1	16	[2]
1975	11,231	9,560	85	1,544	14	17	[2]	96	1	14	[2]
1976	16,091	12,402	77	3,558	22	27	[2]	67	[2]	37	[2]
1977	13,473	8,460	63	4,788	36	92	1	87	1	46	[2]
1978	16,750	11,708	70	4,871	29	35	[2]	84	[2]	52	[2]
1979	15,756	10,344	66	5,114	32	58	[2]	188	1	52	[2]
1980	15,496	9,966	64	5,140	33	22	[2]	351	2	17	[2]
1981	16,593	11,323	68	5,047	30	13	[2]	176	134	[2]	
1982	14,844	10,920	74	3,853	26	10	[2]	33	[2]	28	[2]
1983	15,097	11,561	77	3,452	23	10	[2]	34	[2]	39	[2]
1984	18,896	11,112	59	7,650	40	36	[2]	40	[2]	57	[2]
1985	18,773	10,175	54	8,465	45	16	[2]	58	[2]	60	[2]
1986	22,448	10,857	48	11,469	51	9	[2]	52	[2]	61	[2]
1987	20,884	8,925	43	11,836	57	17	[2]	58	[2]	49	[2]

[1] Gross generation less the electric energy consumed at the generating station.
[2] Less than or equal to 0.5 percent.

SOURCES: Federal Power Commission (1950-76); U.S. Department of Energy, Energy Information Administration, *Power Production, Fuel Consumption and Installed Capacity Data*, annual reports for 1977-80 (EIA-0049); U.S. Department of Energy, Energy Information Administration, *Electric Power Annual*, annual reports for 1981-87 (EIA-0348).

FIGURE 2.2 ANNUAL SALES OF ELECTRICITY, 1960-88



SOURCE: Table 2.3.

TABLE 2.3
MONTHLY SALES OF ELECTRICITY TO CONSUMERS, 1960-88
(thousand kilowatt-hours)

Year	FUEL	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
1960	Residential	87,817	86,156	86,172	78,700	74,016	71,708	69,122	70,021	72,281	72,788	78,160	88,423	935,364
	Commercial	40,851	40,920	40,693	37,987	38,233	37,677	37,542	39,941	40,747	39,473	40,556	44,419	479,039
	Industrial	192,702	206,245	262,319	263,102	267,841	261,080	249,175	250,586	249,098	255,737	243,306	250,196	2,951,387
	Other	15,930	16,460	17,522	17,095	16,958	16,398	16,005	19,356	18,150	18,847	17,586	18,413	208,720
	TOTAL	**337,300**	**349,781**	**406,706**	**396,884**	**397,048**	**386,863**	**371,844**	**379,904**	**380,276**	**386,845**	**379,608**	**401,451**	**4,574,510**
1961	Residential	94,714	89,265	82,793	79,128	78,238	75,587	72,428	72,221	77,654	79,289	83,809	96,727	981,853
	Commercial	43,745	44,111	40,965	40,209	40,766	43,527	42,932	42,376	45,316	41,664	44,097	48,062	517,770
	Industrial	245,523	222,879	241,307	239,366	255,179	250,378	254,137	249,779	237,969	252,472	254,771	271,577	2,975,337
	Other	17,447	17,069	18,282	16,729	17,031	17,904	18,566	21,490	20,826	18,835	18,577	19,636	222,392
	TOTAL	**401,429**	**373,324**	**383,347**	**375,432**	**391,214**	**387,396**	**388,063**	**385,866**	**381,765**	**392,260**	**401,254**	**436,002**	**4,697,352**
1962	Residential	103,908	101,586	94,433	87,906	78,729	80,367	75,441	75,490	79,620	80,599	86,901	96,516	1,041,496
	Commercial	48,422	48,102	45,271	44,031	43,209	43,721	44,099	45,949	45,939	44,353	47,717	49,951	550,764
	Industrial	270,801	243,237	277,876	277,380	283,922	271,608	244,388	238,120	228,811	252,574	249,926	260,819	3,099,462
	Other	19,118	18,525	21,089	21,697	19,619	19,238	20,484	23,301	22,951	23,013	21,460	23,893	254,388
	TOTAL	**442,249**	**411,450**	**438,669**	**431,014**	**425,479**	**414,934**	**384,412**	**382,860**	**377,321**	**400,539**	**406,004**	**431,179**	**4,946,110**
1963	Residential	103,835	110,481	94,644	86,648	85,447	81,989	79,996	80,482	82,349	82,375	87,151	102,086	1,077,483
	Commercial	49,276	50,336	46,788	46,194	45,541	46,639	47,013	48,163	48,917	46,782	47,620	50,646	573,915
	Industrial	263,088	244,329	269,286	260,528	257,708	252,494	254,657	265,693	263,189	279,350	279,286	301,282	3,190,890
	Other	22,146	22,082	22,755	21,353	21,007	20,379	19,564	24,581	22,728	21,934	19,814	20,273	258,616
	TOTAL	**438,345**	**427,228**	**433,473**	**414,723**	**409,703**	**401,501**	**401,230**	**418,919**	**417,183**	**430,441**	**433,871**	**474,287**	**5,100,904**
1964	Residential	113,972	104,130	99,613	98,215	90,238	83,836	83,917	85,367	86,431	89,147	93,850	109,881	1,138,597
	Commercial	53,376	52,679	50,467	49,839	48,678	47,549	48,107	52,939	50,029	49,286	52,242	54,615	609,806
	Industrial	269,594	278,635	307,385	287,199	310,487	305,908	295,793	296,836	299,569	307,596	299,974	284,944	3,543,920
	Other	21,883	22,113	21,961	20,066	20,042	19,200	19,516	22,078	17,852	21,559	20,456	21,846	248,572
	TOTAL	**458,825**	**457,557**	**479,426**	**455,319**	**469,445**	**456,493**	**447,333**	**457,220**	**453,881**	**467,588**	**466,522**	**471,286**	**5,540,895**
1965	Residential	129,757	113,046	107,890	106,939	94,738	90,005	87,104	89,052	92,750	97,290	96,245	111,332	1,216,148
	Commercial	58,183	55,780	53,569	54,060	53,351	50,867	51,996	56,258	54,504	54,215	54,487	57,001	654,271
	Industrial	295,828	283,795	302,647	308,369	315,466	328,079	292,282	310,484	365,742	379,338	377,321	380,099	3,939,450
	Other	23,186	23,626	23,660	22,740	22,635	20,825	21,123	23,415	20,177	22,706	22,808	23,594	270,495
	TOTAL	**506,954**	**476,247**	**487,766**	**492,108**	**486,190**	**489,776**	**452,505**	**479,209**	**533,173**	**553,549**	**550,861**	**572,026**	**6,080,364**
1966	Residential	121,350	124,626	113,653	103,495	99,313	93,596	91,931	93,336	96,337	96,360	105,035	122,301	1,261,333
	Commercial	58,913	60,674	57,259	55,579	55,861	55,136	57,741	59,368	59,127	58,393	59,464	60,268	697,783
	Industrial	387,237	351,127	381,773	375,749	384,072	376,720	381,588	391,139	394,768	398,414	405,337	429,369	4,657,293
	Other	24,598	25,287	26,810	24,087	23,293	21,871	22,643	24,784	21,636	24,241	22,453	24,169	285,872
	TOTAL	**592,098**	**561,714**	**579,495**	**558,910**	**562,539**	**547,323**	**553,903**	**568,627**	**571,868**	**577,408**	**592,289**	**636,107**	**6,902,281**
1967	Residential	126,433	118,444	114,427	111,864	102,479	98,793	96,131	93,841	99,771	97,523	107,138	123,724	1,290,568
	Commercial	63,164	62,283	60,029	59,857	58,476	58,722	59,151	62,878	65,324	69,143	62,491	64,956	746,474
	Industrial	399,328	371,653	396,090	389,956	414,910	409,363	349,729	306,514	311,801	313,395	304,872	314,563	4,282,174
	Other	24,113	25,248	26,258	25,110	23,481	23,089	23,918	25,814	22,892	24,081	24,225	24,479	292,978
	TOTAL	**613,038**	**577,628**	**596,804**	**586,787**	**599,346**	**589,967**	**528,929**	**489,047**	**499,788**	**504,142**	**498,726**	**527,992**	**6,612,194**
1968	Residential	143,663	132,768	121,232	108,338	106,581	104,089	100,963	103,557	102,645	105,823	114,265	129,362	1,373,286
	Commercial	71,463	67,767	65,410	61,562	63,963	65,534	62,364	67,865	66,533	72,710	68,798	71,000	804,969
	Industrial	349,224	301,692	313,222	359,362	415,545	412,147	410,516	463,261	453,171	470,785	514,629	518,356	4,981,910
	Other	26,187	27,093	27,845	22,534	21,925	21,883	20,467	23,614	19,135	21,451	20,882	19,966	272,982
	TOTAL	**590,537**	**529,320**	**527,709**	**551,796**	**608,014**	**603,653**	**594,310**	**658,297**	**641,484**	**670,769**	**718,574**	**738,684**	**7,433,147**
1969	Residential	152,981	157,716	137,080	120,995	107,597	107,005	106,310	107,962	110,372	109,020	123,285	121,922	1,462,245
	Commercial	73,626	79,263	69,229	68,222	67,227	67,699	67,513	72,415	73,330	78,114	71,722	75,036	863,396
	Industrial	523,416	499,814	517,631	515,532	524,633	515,044	509,530	520,316	490,956	517,126	543,581	530,666	6,208,245
	Other	20,957	23,362	24,550	21,783	21,110	20,894	17,922	19,890	18,498	19,675	19,626	18,842	247,109
	TOTAL	**770,980**	**760,155**	**748,490**	**726,532**	**720,567**	**710,642**	**701,275**	**720,583**	**693,156**	**723,935**	**758,214**	**746,466**	**8,780,995**
1970	Residential	152,800	147,131	130,734	126,382	120,747	111,014	111,686	117,988	117,328	120,147	129,342	148,732	1,534,031
	Commercial	78,481	78,370	72,151	72,549	72,646	70,889	74,235	80,235	79,091	87,240	77,183	80,540	923,610
	Industrial	535,198	507,080	517,064	521,683	524,102	499,228	509,589	489,343	464,671	493,165	497,404	470,212	6,028,739
	Other	20,146	22,016	24,030	22,554	22,192	22,161	24,076	24,744	20,763	20,118	21,019	19,914	263,733
	TOTAL	**786,625**	**754,597**	**743,979**	**743,168**	**739,687**	**703,292**	**719,586**	**712,310**	**681,853**	**720,670**	**724,948**	**719,398**	**8,750,113**

TABLE 2.3 (continued)

Year	FUEL	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
1971	Residential	171,644	157,263	138,901	135,619	123,858	117,446	118,165	122,788	129,015	124,349	136,480	157,000	1,632,528
	Commercial	87,202	83,537	78,458	78,899	78,903	76,350	78,401	82,514	85,580	92,637	80,452	86,892	989,825
	Industrial	512,277	490,144	496,830	510,798	528,034	528,014	454,859	428,468	378,792	519,353	551,435	600,152	5,999,156
	Other	21,318	22,036	21,285	23,467	23,067	21,581	22,505	24,363	21,012	21,838	22,599	23,406	268,477
	TOTAL	**792,441**	**752,980**	**735,474**	**748,783**	**753,862**	**743,391**	**673,930**	**658,133**	**614,399**	**758,177**	**790,966**	**867,450**	**8,889,986**
1972	Residential	196,308	174,977	159,083	139,973	129,697	129,433	126,990	125,023	134,719	131,454	146,473	174,196	1,768,326
	Commercial	99,573	98,759	85,723	82,667	80,349	85,918	84,421	84,408	91,807	91,910	87,636	96,428	1,069,599
	Industrial	383,841	367,497	547,387	532,198	531,324	484,725	494,943	480,897	475,312	492,458	470,817	398,909	5,660,308
	Other	22,537	21,683	23,962	22,315	22,021	22,468	20,535	22,039	21,171	21,633	21,567	22,610	264,541
	TOTAL	**702,259**	**662,916**	**816,155**	**777,153**	**763,391**	**722,544**	**726,889**	**712,367**	**723,009**	**737,455**	**726,493**	**692,143**	**8,762,774**
1973	Residential	196,308	174,977	155,431	145,404	136,810	131,440	134,731	138,222	142,991	134,836	151,242	169,992	1,812,384
	Commercial	99,573	98,759	91,616	89,892	88,813	89,850	94,218	99,168	98,973	89,397	92,215	92,810	1,125,284
	Industrial	383,841	367,497	429,807	429,508	391,416	370,707	384,180	428,935	434,784	466,258	478,403	468,563	5,033,899
	Other	22,537	21,683	22,045	21,664	21,123	20,615	20,508	20,327	18,181	18,956	18,528	19,528	245,695
	TOTAL	**702,259**	**662,916**	**698,899**	**686,468**	**638,162**	**612,612**	**633,637**	**686,652**	**694,929**	**709,447**	**740,388**	**750,893**	**8,217,262**
1974	Residential	185,102	178,463	154,353	152,674	139,598	142,545	146,882	156,208	145,167	141,631	154,677	175,550	1,872,850
	Commercial	98,697	97,157	90,171	91,900	86,088	91,539	98,340	104,597	96,879	103,383	95,650	102,055	1,156,456
	Industrial	492,483	491,482	504,374	447,331	439,410	450,886	507,271	511,013	504,551	545,501	546,527	487,813	5,928,642
	Other	20,837	21,098	21,008	19,541	19,077	17,505	16,576	16,611	14,336	16,962	13,771	15,859	213,181
	TOTAL	**797,119**	**788,200**	**769,906**	**711,446**	**684,173**	**702,475**	**769,069**	**788,429**	**760,933**	**807,477**	**810,625**	**781,277**	**9,171,129**
1975	Residential	197,113	197,400	185,873	172,523	162,091	150,032	154,294	164,663	160,058	144,833	170,283	198,560	2,057,723
	Commercial	106,850	109,601	105,285	97,526	100,689	97,171	102,615	110,064	103,845	116,764	102,254	97,590	1,250,254
	Industrial	502,334	468,418	444,306	423,351	420,191	394,480	391,641	384,746	402,479	413,633	438,613	385,277	5,069,469
	Other	16,027	16,803	16,816	15,749	15,943	17,103	16,433	17,883	15,282	16,100	16,484	16,730	197,353
	TOTAL	**822,324**	**792,222**	**752,280**	**709,149**	**698,914**	**658,786**	**664,983**	**677,356**	**681,664**	**691,330**	**727,634**	**698,157**	**8,574,799**
1976	Residential	241,286	224,354	215,650	188,027	172,354	155,076	159,897	163,718	163,180	161,084	188,024	227,972	2,261,000
	Commercial	135,656	120,033	138,292	125,658	117,737	118,578	123,076	127,036	127,802	123,816	128,418	139,325	1,525,000
	Industrial	430,307	417,454	418,118	422,976	475,160	524,969	536,980	509,190	242,368	534,606	553,161	536,896	5,922,000
	Other	18,228	18,619	17,927	17,454	17,249	16,683	15,884	31,570	347	15,931	16,427	16,754	203,000
	TOTAL	**825,477**	**780,460**	**789,987**	**754,115**	**782,500**	**815,306**	**835,837**	**831,514**	**533,697**	**835,437**	**886,030**	**920,947**	**9,911,000**
1977	Residential	253,749	258,803	217,115	212,474	182,513	171,838	162,720	166,556	174,463	179,015	196,996	263,448	2,440,000
	Commercial	140,085	147,674	134,726	133,308	127,309	129,217	129,935	136,898	137,011	129,616	129,696	149,868	1,625,000
	Industrial	554,502	506,893	503,940	501,779	477,528	458,817	452,227	444,899	460,422	451,969	480,088	466,145	5,759,000
	Other	17,478	17,568	16,518	15,764	15,859	15,444	15,119	14,947	14,773	14,735	14,955	15,918	189,000
	TOTAL	**965,814**	**930,938**	**872,299**	**863,325**	**803,209**	**775,316**	**760,001**	**763,300**	**786,669**	**775,335**	**821,735**	**895,379**	**10,013,000**
1978	Residential	303,487	304,192	273,393	225,954	203,167	186,810	176,290	174,003	179,267	185,936	212,693	312,547	2,754,000
	Commercial	156,693	159,381	153,436	142,065	132,248	133,658	141,128	141,397	145,453	138,251	144,122	172,000	1,768,000
	Industrial	500,632	493,841	510,198	500,102	482,065	488,834	518,796	513,508	531,311	524,655	516,905	527,030	6,106,000
	Other	16,742	17,803	17,714	16,386	15,924	14,134	15,197	14,456	14,868	14,481	14,955	16,231	158,000
	TOTAL	**977,554**	**975,217**	**954,741**	**884,507**	**833,404**	**823,436**	**851,411**	**843,364**	**870,899**	**863,323**	**888,675**	**1,027,808**	**10,786,000**
1979	Residential	365,184	370,428	307,256	247,147	228,287	195,000	186,000	187,000	191,000	186,000	214,000	281,000	2,957,000
	Commercial	179,217	182,143	168,278	148,601	148,399	146,000	152,000	158,000	158,000	150,000	148,000	169,000	1,907,000
	Industrial	508,841	458,727	501,042	492,078	503,004	522,000	537,000	512,000	518,000	529,000	518,000	511,000	6,111,000
	Other	13,847	14,784	14,600	13,376	13,451	13,000	13,000	12,000	12,000	12,000	11,000	11,000	154,000
	TOTAL	**1,067,089**	**1,026,082**	**991,176**	**901,202**	**893,141**	**876,000**	**889,000**	**870,000**	**879,000**	**877,000**	**891,000**	**973,000**	**11,129,000**
1980	Residential	312,000	329,000	306,000	264,000	217,000	204,000	187,000	192,000	192,000	198,000	223,000	292,000	2,916,000
	Commercial	174,000	179,000	176,000	159,000	157,000	153,000	153,000	163,000	155,000	154,000	157,000	177,000	1,957,000
	Industrial	533,000	517,000	524,000	516,000	506,000	480,000	456,000	461,000	449,000	441,000	443,000	489,000	5,815,000
	Other	12,000	12,000	13,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	11,000	12,000	137,000
	TOTAL	**1,031,000**	**1,037,000**	**1,019,000**	**951,000**	**891,000**	**848,000**	**808,000**	**828,000**	**808,000**	**804,000**	**834,000**	**970,000**	**10,825,000**
1981	Residential	318,000	295,000	289,000	247,000	229,000	210,000	199,000	193,000	202,000	207,000	235,000	285,000	2,906,000
	Commercial	183,000	177,000	178,000	163,000	160,000	161,000	158,000	170,000	178,000	170,000	165,000	180,000	2,045,000
	Industrial	489,000	461,000	501,000	485,000	496,000	491,000	503,000	513,000	505,000	474,000	448,000	480,000	5,848,000
	Other	14,000	14,000	14,000	13,000	14,000	12,000	13,000	13,000	11,000	13,000	13,000	12,000	157,000
	TOTAL	**1,004,000**	**947,000**	**981,000**	**908,000**	**899,000**	**874,000**	**873,000**	**888,000**	**897,000**	**865,000**	**861,000**	**958,000**	**10,956,000**
1982	Residential	356,000	373,000	312,000	279,000	251,000	218,000	204,000	200,000	202,000	217,000	242,000	323,000	3,178,000
	Commercial	202,000	210,000	188,000	177,000	172,000	162,000	171,000	176,000	184,000	169,000	171,000	199,000	2,180,000
	Industrial	438,000	385,000	389,000	390,000	392,000	383,000	395,000	382,000	407,000	416,000	387,000	394,000	4,759,000
	Other	14,000	14,000	14,000	13,000	14,000	13,000	13,000	14,000	11,000	13,000	13,000	13,000	159,000
	TOTAL	**1,009,000**	**982,000**	**904,000**	**860,000**	**830,000**	**775,000**	**783,000**	**773,000**	**804,000**	**815,000**	**812,000**	**930,000**	**10,276,000**

TABLE 2.3 (continued)

Year	FUEL	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
1983	Residential	348,000	315,000	284,000	268,000	244,000	224,000	206,000	213,000	218,000	223,000	245,000	309,000	3,097,000
	Commercial	206,000	197,000	187,000	182,000	180,000	179,000	193,000	208,000	206,000	191,000	192,000	214,000	2,334,000
	Industrial	393,000	315,000	317,000	311,000	313,000	322,000	352,000	349,000	362,000	387,000	390,000	406,000	4,217,000
	Other	14,000	14,000	15,000	13,000	13,000	13,000	15,000	12,000	14,000	13,000	16,000	14,000	166,000
	TOTAL	**961,000**	**840,000**	**804,000**	**774,000**	**750,000**	**737,000**	**765,000**	**782,000**	**800,000**	**814,000**	**843,000**	**943,000**	**9,813,000**
1984	Residential	429,000	378,000	306,000	278,000	257,000	229,000	213,000	214,000	217,000	233,000	281,000	350,000	3,386,000
	Commercial	237,000	481,000	204,000	196,000	196,000	194,000	193,000	173,000	205,000	193,000	197,000	219,000	2,687,000
	Industrial	425,000	196,000	437,000	432,000	438,000	462,000	473,000	478,000	483,000	467,000	465,000	473,000	5,229,000
	Other	14,000	15,000	14,000	14,000	14,000	14,000	13,000	13,000	13,000	13,000	14,000	13,000	164,000
	TOTAL	**1,106,000**	**1,070,000**	**961,000**	**919,000**	**904,000**	**898,000**	**892,000**	**879,000**	**918,000**	**905,000**	**957,000**	**1,056,000**	**11,466,000**
1985	Residential	417,000	403,000	356,000	283,000	245,000	222,000	218,000	220,000	218,000	246,000	281,000	397,000	3,505,000
	Commercial	233,000	235,000	219,000	195,000	190,000	192,000	207,000	215,000	210,000	192,000	198,000	234,000	2,521,000
	Industrial	458,000	439,000	457,000	453,000	448,000	484,000	470,000	499,000	485,000	474,000	478,000	480,000	5,623,000
	Other	15,000	15,000	14,000	13,000	15,000	14,000	14,000	14,000	14,000	14,000	15,000	16,000	173,000
	TOTAL	**1,123,000**	**1,091,000**	**1,046,000**	**945,000**	**898,000**	**911,000**	**910,000**	**947,000**	**927,000**	**926,000**	**971,000**	**1,126,000**	**11,822,000**
1986	Residential	404,000	346,000	334,000	276,000	258,000	245,000	228,000	220,000	226,000	241,000	268,000	349,000	3,181,000
	Commercial	259,000	187,000	213,000	193,000	189,000	200,000	207,000	205,000	200,000	192,000	196,000	224,000	2,302,000
	Industrial	514,000	481,000	500,000	465,000	456,000	489,000	531,000	549,000	523,000	521,000	534,000	548,000	5,948,000
	Other	16,000	12,000	12,000	12,000	11,000	17,000	19,000	19,000	17,000	11,000	11,000	12,000	161,000
	TOTAL	**1,193,000**	**1,026,000**	**1,059,000**	**946,000**	**914,000**	**951,000**	**984,000**	**992,000**	**966,000**	**966,000**	**1,009,000**	**1,133,000**	**11,593,000**
1987	Residential	387,000	339,000	272,000	285,000	299,000	207,000	240,000	250,000	234,000	265,000	304,000	355,000	3,437,000
	Commercial	233,000	209,000	202,000	198,000	232,000	218,000	221,000	235,000	214,000	227,000	209,000	225,000	2,623,000
	Industrial	533,000	477,000	527,000	494,000	549,000	526,000	558,000	557,000	520,000	552,000	526,000	565,000	6,384,000
	Other	13,000	12,000	12,000	11,000	15,000	14,000	18,000	25,000	16,000	13,000	11,000	11,000	172,000
	TOTAL	**1,165,000**	**1,037,000**	**1,012,000**	**989,000**	**1,095,000**	**966,000**	**1,037,000**	**1,067,000**	**985,000**	**1,057,000**	**1,050,000**	**1,156,000**	**12,616,000**
1988	Residential	377,000	329,000	295,000	291,000	231,000	232,000	259,000	250,000	245,000	233,000	353,000	353,000	3,448,000[P]
	Commercial	229,000	203,000	214,000	209,000	214,000	218,000	237,000	220,000	232,000	207,000	240,000	199,000	2,622,000[P]
	Industrial	542,000	504,000	541,000	498,000	534,000	555,000	581,000	552,000	549,000	534,000	556,000	536,000	6,482,000
	Other	12,000	12,000	12,000	12,000	12,000	12,000	12,000	17,000	13,000	12,000	15,000	7,000	148,000[P]
	TOTAL	**1,160,000**	**1,048,000**	**1,062,000**	**1,009,000**	**991,000**	**1,017,000**	**1,089,000**	**1,039,000**	**1,038,000**	**986,000**	**1,165,000**	**1,095,000**	**12,699,000[P]**

P: Preliminary

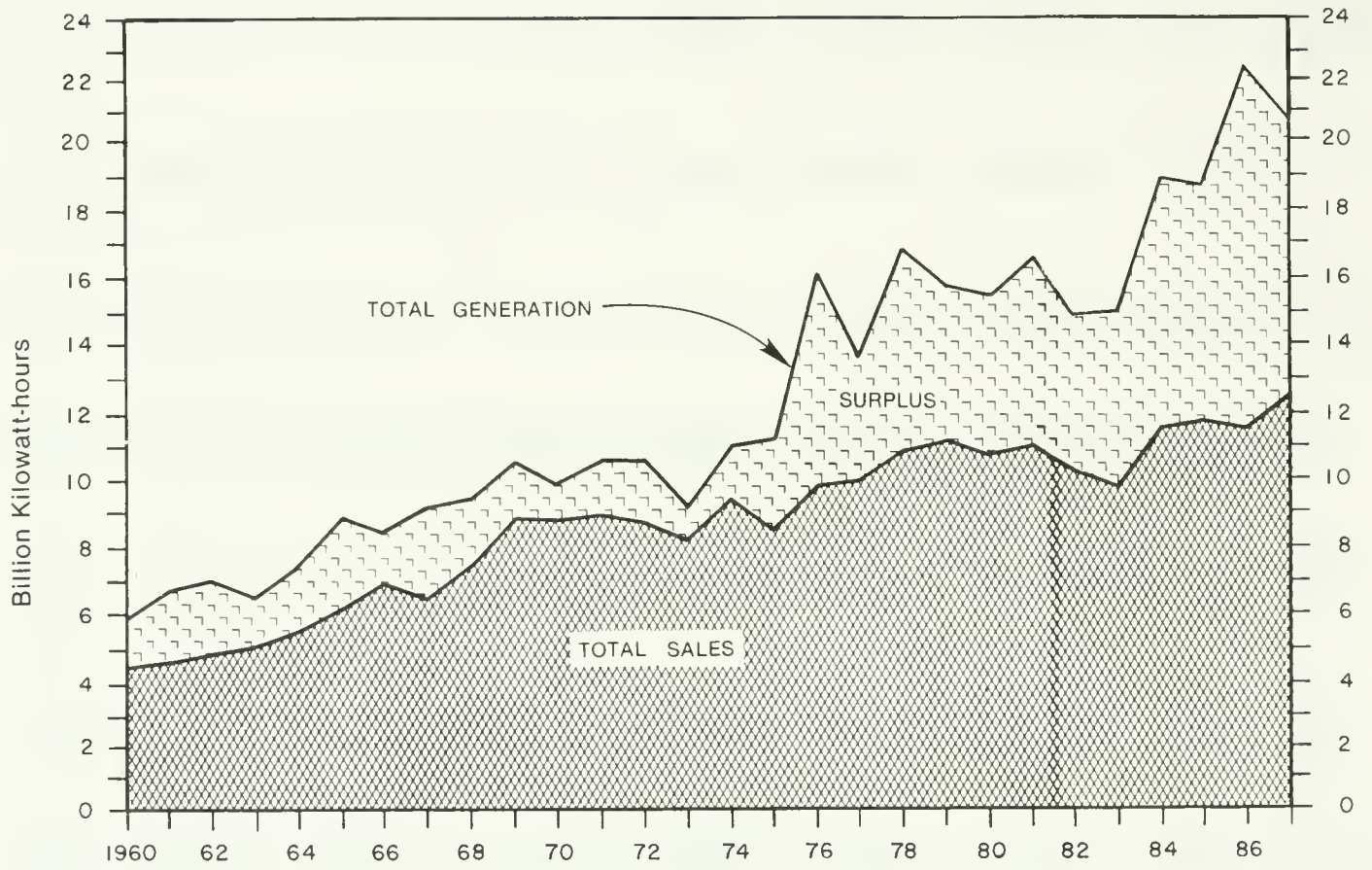
NOTE: In June 1979, DOE changed from reporting in thousands of kilowatt-hours to reporting in millions of kilowatt-hours. Accordingly, beginning in 1979, total annual figures are computed from figures rounded to the nearest million kilowatt-hours.

All 1981 figures have been revised due to a change in DOE reporting definitions; DOE revised the annual totals (but not the monthly detail figures) for the years 1976-1980 to reflect the new reporting definitions.

SOURCES: Federal Power Commission (1960-76); U.S. Department of Energy, Energy Information Administration, *Electric Power Statistics*, monthly reports for 1977-78 (EIA-0034); U.S. Department of Energy, Energy Information Administration, *Financial Statistics of Electric Utilities and Interstate Natural Gas Pipeline Companies*, monthly reports for 1979 through February 1980 (EIA-0147); U.S. Department of Energy, Energy Information Administration, *Sales, Revenue, and Income of Electric Utilities*, monthly reports for March 1980 through October 1981(EIA-0147); U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly*, monthly reports for November 1981 through December 1988 (EIA-0226).

Annual totals are revised based on information in the U.S. Department of Energy, Energy Information Administration, *Electric Power Annual* publications (EIA-0348).

FIGURE 2.3 ANNUAL GENERATION AND SALES OF ELECTRICITY, 1960-87



SOURCES: Generation: Table 2.2.
Sales: Table 2.3.

TABLE 2.4
ANNUAL SALES OF ELECTRICITY BY CLASS OF SERVICE, 1950-87
(million kilowatt-hours)

Year	TOTAL SALES TO CUSTOMERS	Residential	Commercial	Industrial	Street & Highway Lighting	Other Public Authorities	Railroads and Railways	Inter-departmental
1950	**2,351**	378	219	1,559	16	15	154	11
1951	**2,437**	423	238	1,566	18	19	164	10
1952	**2,699**	484	256	1,757	20	17	159	6
1953	**3,002**	501	302	1,987	20	33	154	5
1954	**2,772**	562	351	1,649	24	33	145	8
1955	**3,658**	643	389	2,407	25	34	154	6
1956	**4,666**	720	416	3,309	26	37	153	5
1957	**4,418**	782	462	2,975	28	40	127	4
1958	**4,268**	810	474	2,796	29	43	108	8
1959	**4,074**	893	512	2,468	30	55	99	17
1960	**4,617**	935	529	2,973	33	52	89	6
1961	**4,774**	953	603	3,028	33	69	83	5
1962	**5,044**	1,024	652	3,152	36	82	91	7
1963	**5,192**	1,055	715	3,190	36	102	88	6
1964	**5,647**	1,117	772	3,534	39	105	75	5
1965	**6,228**	1,172	846	3,965	40	114	85	6
1966	**7,076**	1,207	894	4,718	43	121	88	6
1967	**6,866**	1,310	936	4,338	43	144	82	13
1968	**7,741**	1,385	1,027	5,055	47	140	69	18
1969	**9,152**	1,469	1,117	6,316	51	123	57	19
1970	**9,091**	1,521	1,188	6,120	52	117	73	20
1971	**9,214**	1,614	1,254	6,079	53	113	80	21
1972	**9,191**	1,710	1,325	5,888	53	113	81	21
1973	**8,572**	1,852	1,447	5,031	55	117	52	18
1974	**9,540**	1,877	1,488	5,963	57	113	23	19
1975	**8,867**	2,038	1,544	5,089	64	113	—	19
1976	**9,891**	2,232	1,669	5,795	60	115	—	20
1977	**10,036**	2,433	2,225	5,195	60	101	—	22
1978	**10,748**	2,667	1,930	5,953	60	104	—	24
1979	**11,066**	2,868	2,062	5,945	61	107	—	23
1980	**10,849**	2,894	2,119	5,661	61	97	—	17
1981	**11,048**	2,946	2,114	5,797	61	114	—	16
1982	**10,550**	3,248	2,176	4,916	62	132	—	17
1983	**10,074**	3,108	2,436	4,326	64	126	—	14
1984	**11,639**	3,374	2,577	5,477	63	124	—	23
1985	**12,070**	3,471	2,689	5,689	77	116	—	28
1986	**12,065**	3,297	2,618	5,932	74	112	—	32
1987[P]	**12,184**	3,142	2,648	6,193	68	112	—	21

[P] Preliminary.

SOURCE: Edison Electric Institute, *Statistical Yearbook of the Electric Utility Industry*, 1950-87.

TABLE 2.5
AVERAGE ANNUAL PRICES FOR ELECTRICITY SOLD BY CLASS OF SERVICE, 1950-87
(cents per kilowatt-hour)

Year	TOTAL REVENUES FROM CUSTOMERS	Residential	Commercial	Industrial	Street & Highway Lighting	Other Public Authorities	Railroads and Railways	Inter-departmental
1950	**1.06**	2.70	2.42	0.50	2.41	0.84	0.57	0.54
1951	**1.08**	2.66	2.37	0.51	2.32	0.73	0.54	0.56
1952	**1.08**	2.60	2.39	0.50	2.28	0.80	0.54	0.82
1953	**1.03**	2.52	2.42	0.47	2.35	0.52	0.54	0.88
1954	**1.14**	2.44	2.37	0.48	2.18	0.58	0.54	0.73
1955	**0.99**	2.34	2.32	0.43	2.25	0.60	0.54	0.92
1956	**0.86**	2.34	2.17	0.38	2.32	0.65	0.55	1.10
1957	**0.93**	2.28	2.08	0.40	2.30	0.66	0.54	1.38
1958	**0.99**	2.34	2.15	0.41	2.39	0.67	0.54	0.88
1959	**1.10**	2.37	2.22	0.43	2.56	0.70	0.55	0.59
1960	**1.05**	2.33	2.25	0.43	2.45	0.79	0.56	1.27
1961	**1.06**	2.32	2.18	0.45	2.70	0.74	0.55	1.70
1962	**1.07**	2.29	2.13	0.46	2.50	0.61	0.55	1.43
1963	**1.07**	2.25	2.06	0.45	2.78	0.78	0.57	1.67
1964	**1.03**	2.20	2.02	0.45	2.56	0.71	0.53	2.00
1965	**0.98**	2.12	1.93	0.44	2.75	0.70	0.59	1.67
1966	**0.92**	2.09	1.92	0.43	2.56	0.66	0.57	1.67
1967	**0.95**	2.04	1.89	0.42	2.79	0.63	0.49	1.08
1968	0.90	1.99	1.83	0.40	2.77	0.61	0.58	1.11
1969	0.88	2.10	1.93	0.41	2.75	0.57	0.53	1.05
1970	**0.94**	2.13	1.94	0.42	2.88	0.60	0.55	1.00
1971	**0.95**	2.12	1.94	0.43	3.02	0.62	0.50	0.95
1972	**1.00**	2.16	1.98	0.44	3.21	0.53	0.49	1.19
1973	**1.16**	2.21	2.04	0.53	3.27	0.60	0.58	1.67
1974	**1.10**	2.23	2.05	0.50	3.23	0.58	0.53	1.41
1975	**1.25**	2.19	2.08	0.62	2.99	0.58	—	1.51
1976	**1.24**	2.23	2.06	0.60	3.32	0.73	—	1.67
1977	**1.38**	2.38	1.90	0.67	3.53	0.80	—	1.79
1978	**1.53**	2.62	2.50	0.72	3.88	0.87	—	2.16
1979	**1.62**	2.67	2.52	0.80	3.86	0.87	—	1.99
1980	**1.87**	2.95	2.78	0.98	4.00	0.97	—	1.91
1981	**2.24**	3.38	3.19	1.30	4.50	1.42	—	2.34
1982	**2.81**	3.58	3.30	2.09	4.69	1.69	—	2.70
1983	**3.31**	4.19	3.88	2.37	5.28	1.83	—	3.01
1984	**3.38**	4.30	3.88	2.57	5.72	2.02	—	2.58
1985	**3.56**	4.70	4.20	2.55	7.35	2.08	—	2.15
1986	**3.71**	5.02	4.54	2.60	8.04	2.54	—	1.89
1987[P]	**3.83**	5.23	4.68	2.72	8.79	2.65	—	3.49

[P] Preliminary.

NOTE: Average annual prices were calculated by dividing total revenue (thousands of dollars) by total sales (millions of kilowatt-hours).

SOURCE: Edison Electric Institute, *Statistical Yearbook of the Electric Utility Industry*, 1950-87.

TABLE 2.6
MONTHLY CONSUMPTION OF FUELS BY ELECTRIC UTILITIES, 1960-88
(Coal: thousand short tons; Petroleum: thousand barrels; Natural Gas: million cubic feet)

Year	FUEL	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
1960	Coal	22.6	20.0	21.3	15.2	14.2	4.8	13.5	14.7	9.1	11.9	15.7	23.9	**186.9**
	Oil	0.0	[1]	[1]	[1]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	[1]
	Gas	51.1	44.0	52.8	49.0	25.8	16.7	7.7	9.2	12.1	7.3	17.1	48.5	**341.3**
1961	Coal	24.1	19.8	25.6	21.9	25.0	5.6	20.1	23.9	18.3	23.1	24.7	30.4	**262.5**
	Oil	0.0	0.0	0.0	[1]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	[1]
	Gas	30.2	24.6	18.9	18.0	8.2	7.7	7.3	9.9	6.3	17.6	9.2	198.2	**356.2**
1962	Coal	29.5	25.7	29.3	23.3	26.2	11.7	21.8	23.9	19.9	26.4	23.6	30.3	**291.6**
	Oil	0.9	0.0	0.0	0.0	0.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**1.3**
	Gas	329.0	312.4	396.4	374.2	148.1	100.7	6.7	308.7	488.0	506.3	485.2	256.8	**3712.5**
1963	Coal	31.8	27.1	26.2	27.3	29.0	3.5	24.4	25.9	17.3	25.5	22.4	25.1	**285.5**
	Oil	0.6	0.0	0.0	0.0	[1]	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**0.7**
	Gas	341.7	220.0	275.3	263.3	28.6	160.2	209.0	351.2	413.7	363.8	308.2	368.3	**3303.3**
1964	Coal	21.8	19.9	25.3	21.5	24.5	28.0	25.7	23.9	18.7	24.8	26.2	33.5	**293.8**
	Oil	0.0	0.0	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	2.8	**3.6**
	Gas	213.7	202.8	213.8	200.7	58.9	132.8	194.3	237.9	283 2	276.4	186.3	248.7	**2449.5**
1965	Coal	29.4	24.4	28.2	28.6	21.1	23.0	25.5	12.3	26.6	26.0	27.2	23.5	**295.8**
	Oil	0.0	[1]	0.0	0.0	0.0	0.0	0.1	[1]	0.3	0.0	0.0	0.2	**0.7**
	Gas	199.3	176.8	187.6	173.0	5.7	115.8	163.6	179.4	185.4	185.2	191.6	228.9	**1992.3**
1966	Coal	31.9	29.5	24.8	27.4	30.3	27.0	29.1	12.8	25.1	28.7	27.8	29.1	**323.5**
	Oil	0.5	0.0	1.3	0.4	0.3	0.1	3.3	24.0	20.8	20.9	10.6	0.0	**82.2**
	Gas	225.9	192.0	209.7	189.3	217.9	161.0	260.1	267.3	241.1	297.5	408.4	307.0	**2977.2**
1967	Coal	29.8	29.0	28.6	24.8	27.0	19.8	20.9	27.6	28.8	27.8	27.8	33.5	**325.4**
	Oil	[1]	2.0	4.0	0.0	0.0	0.0	0.0	0.0	[1]	0.0	[1]	0.0	**6.1**
	Gas	223.0	171.8	56.5	12.0	3.7	6.6	5.3	4.3	3.1	6.5	4.9	4.8	**502.5**
1968	Coal	34.4	29.6	25.1	29.7	28.7	28.6	25.7	19.9	33.9	56.5	37.8	49.3	**399.2**
	Oil	0.0	0.0	0.0	0.0	0.0	[1]	8.2	3.2	0.0	[1]	3.3	8.1	**22.9**
	Gas	7.5	2.9	3.7	1.8	3.8	2.8	97.4	142.3	30.0	85.6	120.1	133.4	**631.3**
1969	Coal	56.9	52.9	56.9	47.6	30.3	27.8	44.8	35.6	77.6	44.2	41.5	57.8	**576.6**
	Oil	11.9	1.5	5.5	0.0	3.4	2.8	1.3	0.5	0.0	37.1	25.5	15.4	**104.9**
	Gas	149.4	91.3	115.4	82.2	138.9	177.4	123.3	86.2	92.3	178.2	149.2	136.7	**1520.5**
1970	Coal	82.4	56.9	67.5	51.2	36.9	25.5	29.6	33.3	67.0	89.7	91.1	91.6	**722.7**
	Oil	13.0	11.3	1.4	0.0	[1]	0.1	0.1	0.0	0.0	[1]	0.0	[1]	**26.0**
	Gas	159.7	126.5	106.4	94.5	160.2	197.2	294.7	141.4	70.3	106.0	457.6	614 9	**2529.4**
1971	Coal	92.0	60.5	58.3	48.4	43.3	44.4	33.9	15.7	30.3	71.0	87.5	86.7	**672.0**
	Oil	[1]	0.1	[1]	0.0	[1]	[1]	[1]	0.0	0.0	[1]	0.0	0.0	**0.2**
	Gas	279.3	76.8	68.7	58.4	150.3	123.1	15.4	4.0	17.0	61.3	79.3	146.2	**1079.8**
1972	Coal	86.6	75.1	55.2	55.7	30.8	43.1	64.3	67.1	43.9	77.8	74.4	94.7	**768.7**
	Oil	1.6	[1]	[1]	0.0	[1]	[1]	[1]	[1]	[1]	0.9	0.2	14.6	**17.5**
	Gas	83.1	54.0	64.0	40.9	49.1	74.4	100.1	95 2	50.8	91.7	224.7	289.4	**1217.4**
1973	Coal	85.6	69.0	76.3	92.1	94.3	26.0	50.9	91.6	53.0	74.7	87.6	91.5	**892.6**
	Oil	1.8	0.2	0.1	9.2	24 8	0.4	8.1	18.4	0.2	50.1	38.8	0.1	**152.2**
	Gas	326.3	233.7	198.4	185.3	177 8	99.8	0.0	191.0	166.0	271.8	178.0	139.3	**2167.4**
1974	Coal	79.8	78.3	73.6	65.1	61 2	18.8	63.4	72.9	77.5	83.7	89.5	90.8	**854.6**
	Oil	10.6	[1]	[1]	[1]	0.3	[1]	[1]	[1]	[1]	[1]	[1]	2.9	**14.0**
	Gas	206.6	92.8	109.6	106.7	69.8	54.7	7.2	51.5	55.5	111.8	82.8	89.0	**1038.0**
1975	Coal	83.2	78.7	88.3	88.8	76.4	47.3	61.8	70.8	59.3	84.5	145.8	176.6	**1061.3**
	Oil	1.9	[1]	[1]	[1]	0.1	[1]	[1]	[1]	14.2	17.8	10.1	18.3	**62.6**
	Gas	148.0	113.5	90.5	51.4	50.0	64.0	171.3	104.9	105.0	56.6	47.6	70.6	**1073.3**
1976	Coal	193.1	175.6	179.8	140.8	91.8	94.6	145.7	146.8	268.2	326.1	287.9	323.1	**2373.7**
	Oil	6.3	6.2	5.2	6.3	1.0	7.6	11 2	10.2	5.4	7.3	9.4	4.5	**81.1**
	Gas	58.7	47.5	51.5	39.2	28.5	43.6	70.4	70.4	49.8	113.3	61.1	74.5	**708.5**

TABLE 2.6 (continued)

Year	FUEL	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
1977	Coal	315.1	188.7	192.7	262.7	188.1	266.3	288.2	286.0	320.2	245.9	284.8	357.8	**3196.7**
	Oil	9.6	3.9	10.8	72.0	27.3	7.1	24.7	23.0	1.1	3.5	6.6	5.6	**195.3**
	Gas	87.6	38.8	56.9	106.7	36.8	45.1	119.7	229.2	35.5	75.2	73.1	48.7	**953.3**
1978	Coal	281.2	305.8	267.9	170.8	176.2	194.1	229.7	300.2	287.2	327.9	297.0	346.1	**3184.2**
	Oil	12.8	4.8	5.2	9.3	9.6	10.4	7.8	10.3	5.5	6.0	8.7	7.8	**98.1**
	Gas	48.0	71.9	40.5	52.7	35.8	9.4	50.6	55.4	85.4	103.7	156.1	199.9	**909.4**
1979	Coal	325.0	278.8	298.5	197.4	184.4	284.0	268.2	337.2	318.7	328.5	320.6	319.9	**3461.4**
	Oil	39.8	20.1	8.4	4.2	15.6	14.4	11.4	5.3	7.9	7.7	7.0	4.7	**146.5**
	Gas	104.0	151.8	88.2	36.2	55.9	77.8	170.4	270.2	297.0	447.0	271.1	350.9	**2320.4**
1980	Coal	317.2	295.6	314.7	207.8	112.9	88.0	304.9	341.0	390.0	326.0	324.0	330.0	**3351.6**
	Oil	7.7	6.3	5.6	1.0	5.2	11.0	6.5	2.0	7.0	2.0	4.0	1.0	**58.6**
	Gas	460.6	435.4	434.8	447.0	12.9	24.1	78.4	533.0	438.0	487.0	482.0	349.0	**4182.1**
1981	Coal	306.0	309.0	364.0	293.0	123.0	122.0	220.0	310.0	314.0	358.0	293.0	326.0	**3337.9**
	Oil	5.0	4.0	1.0	3.0	5.0	2.0	6.0	3.0	3.0	1.0	4.0	1.0	**38.5**
	Gas	130.0	260.0	481.0	341.0	21.0	25.0	19.0	51.0	67.0	300.0	252.0	121.0	**2069.4**
1982	Coal	310.0	212.0	111.0	117.0	109.0	125.0	137.0	243.0	272.0	330.0	311.0	318.0	**2595.8**
	Oil	2.0	1.0	5.0	1.0	1.0	5.0	2.0	4.0	3.0	2.0	2.0	3.0	**30.6**
	Gas	76.0	68.0	6.0	3.0	1.0	[2]	10.0	22.0	39.0	34.0	40.0	38.0	**337.0**
1983	Coal	271.0	185.0	118.0	96.0	86.0	92.0	121.0	229.0	283.0	334.0	260.0	280.0	**2356.0**
	Oil	1.0	1.0	2.0	5.0	1.0	[2]	[2]	8.0	3.0	2.0	2.0	5.0	**31.0**
	Gas	38.0	36.0	6.0	1.0	4.0	2.0	38.0	41.0	39.0	42.0	24.0	65.0	**335.0**
1984	Coal	474.0	427.0	355.0	212.0	232.0	129.0	424.0	569.0	537.0	562.0	577.0	615.0	**5113.0**
	Oil	8.0	6.0	9.0	5.0	4.0	7.0	6.0	5.0	11.0	7.0	5.0	6.0	**78.0**
	Gas	39.0	46.0	2.0	2.0	1.0	10.0	7.0	52.0	29.0	45.0	59.0	69.0	**360.0**
1985	Coal	562.0	562.0	622.0	342.0	145.0	272.0	559.0	608.0	577.0	483.0	331.0	418.0	**5480.0**
	Oil	1.0	3.0	4.0	3.0	1.0	2.0	12.0	2.0	1.0	5.0	1.0	3.0	**38.0**
	Gas	52.0	37.0	41.0	17.0	4.0	19.0	41.0	40.0	44.0	71.0	46.0	55.0	**468.0**
1986	Coal	652.0	549.0	193.0	227.0	251.0	247.0	778.0	928.0	932.0	951.0	941.0	789.0	**7438.0**
	Oil	[3]	1.0	2.0	2.0	[3]	2.0	4.0	4.0	1.0	1.0	4.0	3.0	**25.0**
	Gas	55.0	46.0	14.0	3.0	[3]	29.0	28.0	50.0	58.0	54.0	31.0	38.0	**407.0**
1987	Coal	575.0	455.0	593.0	335.0	174.0	257.0	592.0	886.0	878.0	952.0	851.0	981.0	**7530.0**
	Oil	2.0	3.0	2.0	2.0	1.0	8.0	2.0	7.0	6.0	2.0	5.0	3.0	**44.0**
	Gas	49.0	43.0	46.0	42.0	17.0	43.0	43.0	45.0	44.0	38.0	37.0	30.0	**478.0**
1988	Coal	900.0	903.0	837.0	766.0	640.0	708.0	958.0	933.0	872.0	982.0	923.0	986.0	**10,408.0**[P]
	Oil	3.0	4.0	5.0	7.0	5.0	15.0	3.0	4.0	6.0	6.0	3.0	1.0	**62.0**[P]
	Gas	15.0	21.0	27.0	21.0	32.0	3.0	31.0	34.0	36.0	20.0	17.0	30.0	**287.0**[P]

[P] Preliminary
[1] less than 0.1
[2] less than 0.5
[3] less than 1.0

NOTES: Beginning in August 1980, DOE changed from reporting in tons, barrels, and thousand cubic feet to reporting in thousand short tons, thousand barrels, and million cubic feet. Accordingly, beginning in August 1980, data are rounded to the nearest thousand short tons, thousand barrels, or million cubic feet.

SOURCES: Federal Energy Regulatory Commission (formerly Federal Power Commission), Form 4 News Releases (1960-76); U.S. Department of Energy, Energy Information Administration, *Electric Power Statistics*, monthly reports for 1977-78 (EIA-0034); U.S. Department of Energy, Energy Information Administration, *Power Production, Fuel Consumption and Installed Capacity Data*, annual report for 1979 (EIA-0049); U.S. Department of Energy, Energy Information Administration, *Preliminary Power Production, Fuel Consumption and Installed Capacity Data*, monthly reports for January-July 1980 (EIA-0005); U.S. Department of Energy, Energy Information Administration, *Electric Power Monthly*, monthly reports for August 1980 through December 1988 (EIA-0226).

Annual totals are revised based on information in the U.S. Department of Energy, Energy Information Administration, *Electric Power Annual* publications (EIA-0348).

TABLE 2.7
TYPICAL ELECTRIC BILLS FOR RESIDENTIAL SERVICE, 1980-88
(dollars)

As of January 1 of the Year	Utility	MONTHLY BILLS 250 kWH	500 kWH	750 kWH	1,000 kWH	2,500 kWH
1980	Montana-Dakota Utilities[1]	13.84	21.34	28.84	36.34	81.34
	Montana-Dakota Utilities[2]	15.34	22.84	30.34	37.84	82.84
	Montana Power Company	8.45	14.65	20.85	27.05	64.26
	Pacific Power and Light Company	6.78	11.66	16.33	21.11	49.78
	Average for Rural Electric Cooperatives	**12.46**	**18.15**	**23.82**	**29.47**	**58.33**
	Montana Average	**8.77**	**14.99**	**21.20**	**27.41**	**64.71**
	U.S. Average	**15.29**	**27.80**	**36.94**	**48.79**	**110.91**
1981	Montana-Dakota Utilities[1]	14.56	22.78	31.00	39.22	88.55
	Montana-Dakota Utilities[2]	16.06	24.28	32.50	40.72	90.05
	Montana Power Company	10.04	17.41	24.78	32.16	76.39
	Pacific Power and Light Company	7.56	13.12	18.68	24.24	57.60
	Average for Rural Electric Cooperatives	**12.81**	**19.61**	**25.99**	**32.32**	**66.72**
	Montana Average	**10.24**	**17.57**	**24.90**	**32.23**	**76.20**
	U.S. Average	**17.76**	**32.61**	**43.99**	**58.16**	**133.90**
1982	Montana-Dakota Utilities[1]	13.91	30.49	47.74	64.99	168.49
	Montana-Dakota Utilities[2]	15.41	31.99	49.24	66.49	169.99
	Montana Power Company	9.90	17.17	24.43	31.69	75.27
	Pacific Power and Light Company[3]	3.98	10.12	16.80	23.48	79.47
	Pacific Power and Light Company[4]	3.98	10.12	18.24	27.33	81.86
	Average for Private Utilities	**9.84**	**17.69**	**25.61**	**33.53**	**81.98**
	Average for Rural Electric Cooperatives	**13.95**	**21.65**	**28.35**	**36.66**	**79.00**
	Montana Average	**9.84**	**17.69**	**25.61**	**33.53**	**81.98**
	U.S. Average	**19.82**	**36.96**	**50.07**	**66.39**	**155.69**
1983	Montana-Dakota Utilities[1]	13.91	30.49	47.74	64.99	168.49
	Montana-Dakota Utilities[2]	15.41	31.99	49.24	66.49	169.99
	Montana Power Company	12.23	21.18	30.12	39.07	92.76
	Pacific Power and Light Company[3]	5.36	13.51	22.37	31.22	105.23
	Pacific Power and Light Company[4]	5.36	13.51	24.14	35.96	106.87
	Average for Private Utilities	**11.95**	**21.38**	**30.90**	**40.42**	**98.73**
	Average for Rural Electric Cooperatives	**13.95**	**21.65**	**28.35**	**36.66**	**79.00**
	Montana Average	**11.95**	**21.38**	**30.90**	**40.42**	**98.73**
	U.S. Average	**20.72**	**38.35**	**52.74**	**69.96**	**160.22**
1984	Montana-Dakota Utilities[1]	16.91	34.39	52.56	70.74	179.79
	Montana-Dakota Utilities[2]	18.41	35.89	54.06	72.24	181.29
	Montana Power Company	12.12	21.00	29.89	38.77	92.09
	Pacific Power and Light Company[3]	6.22	15.56	25.67	35.79	119.64
	Pacific Power and Light Company[4]	6.22	15.56	27.64	41.04	121.44
	Average for Private Utilities	**12.11**	**21.62**	**31.22**	**40.82**	**99.76**
	Average for Rural Electric Cooperatives[5]	**15.35**	**24.78**	**34.01**	**43.06**	**96.63**
	Montana Average	**12.11**	**21.62**	**31.22**	**40.82**	**99.76**
	U.S. Average	**21.57**	**40.18**	**54.76**	**72.77**	**166.00**
1985	Montana-Dakota Utilities[1]	20.83	39.66	58.49	77.32	190.30
	Montana-Dakota Utilities[2]	22.33	41.16	59.99	78.82	191.80
	Montana Power Company[3]	12.08	22.15	32.21	42.28	102.69
	Montana Power Company[4]	9.75	17.50	25.24	32.99	79.46
	Pacific Power and Light Company[3]	8.91	19.63	31.30	42.98	113.03
	Pacific Power and Light Company[4]	8.91	18.67	29.15	39.63	102.51
	Average for Private Utilities	**12.50**	**23.22**	**33.98**	**44.75**	**109.37**
	Average for Rural Electric Cooperatives[5]	**19.57**	**30.86**	**42.35**	**53.64**	**121.29**
	Montana Average	**12.50**	**23.22**	**33.98**	**44.75**	**109.37**
	U.S. Average	**22.61**	**41.86**	**57.86**	**76.37**	**175.99**

TABLE 2.7 (continued)

As of January 1 of the Year	Utility	MONTHLY BILLS 250 kWH	500 kWh	750 kWh	1,000 kWh	2,500 kWh
1986	Montana-Dakota Utilities	20.83	39.66	58.49	77.32	190.30
	Montana Power Company[3]	14.76	27.08	39.39	51.70	125.58
	Montana Power Company[4]	11.92	21.39	30.86	40.34	97.16
	Pacific Power and Light Company[3]	11.44	24.45	38.40	52.35	136.03
	Pacific Power and Light Company[4]	11.44	23.36	35.93	48.51	123.98
	U.S. Bureau of Indian Affairs	11.75	20.50	29.25	38.00	90.50
	Average for Private Utilities	**14.98**	**27.80**	**40.67**	**53.54**	**130.78**
	Average for Rural Electric Cooperatives[5]	**19.34**	**30.83**	**42.28**	**53.64**	**120.64**
	Montana Average	**14.96**	**27.75**	**40.59**	**53.43**	**130.49**
	U.S. Average	**22.97**	**42.54**	**58.79**	**77.50**	**177.21**
1987	Montana-Dakota Utilities	21.96	40.92	59.88	78.84	192.60
	Montana Power Company[3]	15.81	29.00	42.18	55.36	134.46
	Montana Power Company[4]	12.77	22.91	33.05	43.19	104.04
	Pacific Power and Light Company[3]	12.46	24.44	37.30	50.16	127.32
	Pacific Power and Light Company[4]	12.46	23.37	34.90	46.42	115.57
	U.S. Bureau of Indian Affairs	11.75	20.50	29.25	38.00	90.50
	Average for Private Utilities	**16.03**	**29.55**	**43.12**	**56.68**	**138.10**
	Average for Rural Electric Cooperatives[5]	**19.79**	**31.52**	**43.21**	**54.89**	**123.28**
	Montana Average	**16.00**	**29.49**	**43.02**	**56.55**	**137.75**
	U.S. Average	**22.22**	**40.88**	**56.78**	**74.57**	**168.69**
1988	Montana-Dakota Utilities[5]	20.43	37.86	55.29	72.72	177.30
	Montana Power Company[3]	16.41	30.09	43.76	57.44	139.51
	Montana Power Company[4]	13.25	23.77	34.29	44.82	107.95
	Pacific Power and Light Company[5]	17.31	29.62	40.20	49.63	106.23
	U.S. Bureau of Indian Affairs[5]	11.75	20.50	29.25	38.00	90.50
	Average for Private Utilities	**16.75**	**30.61**	**44.35**	**58.03**	**140.09**
	Average for Rural Electric Cooperatives[5]	**20.79**	**33.13**	**45.45**	**57.77**	**127.23**
	Montana Average	**16.71**	**30.53**	**44.24**	**57.88**	**139.73**
	U.S. Average	**22.26**	**41.21**	**57.39**	**74.15**	**171.13**

NA Not Available
[1] Data computed for service from overhead distribution system - majority of customers.
[2] Data computed for service from underground distribution system - majority of customers.
[3] Data based on rates effective during utility-specified winter period.
[4] Data based on rates effective during utility-specified summer period
[5] Data based on utility-specified annual rates.

NOTE: The kilowatt-hour usage categories represent broad monthly residential consumption patterns.
250 and 500 kWh: lighting, appliances, refrigeration, and cooking
750 and 1,000 kWh: lighting, appliances, refrigeration, cooking and water heating
2,500 kWh: lighting, appliances, refrigeration, cooking, water heating, and/or space heating.

SOURCES: U.S. Department of Energy, Energy Information Administration, *Typical Electric Bills*, annual reports for 1980-88 (EIA-0040).

The average bills for rural electric cooperatives for the years 1980-81 were obtained from U.S. Department of Agriculture, Rural Electrification Administration, *Statistical Report, Rural Electric Borrowers*, annual reports for 1980-81 (REA bulletin number 1-1).

TABLE 2.8
TYPICAL MONTHLY ELECTRIC BILLS FOR COMMERCIAL SERVICE, 1975-88
(dollars)

Billing Demand: / Consumption:	3 kW 375 kWh	6 kW 750 kWh	12 kW 1,500 kWh	30 kW 6,000 kWh	40 kW 10,000 kWh	50 kW 12,500 kWh	100 kW 30,000 kWh
Date							
January 1, 1975	15.32	29.46	60.39	178.88	238.78		
January 1, 1976	15.32	29.46	60.39	178.88	238.78		
January 1, 1977	15.32	29.46	60.39	178.88	238.78		
January 1, 1978	18.53	35.63	73.05	216.59	289.19		
January 1, 1979	17.81	34.32	70.25	212.61	289.35		
January 1, 1980		34.50	70.62	213.73	290.87	343.66	664.17
January 1, 1981		41.01	83.95	254.07	345.77	408.52	789.53
January 1, 1982		40.41	82.72	250.34	340.70	402.53	777.95
January 1, 1983		50.22	102.82	311.16	423.47	500.32	966.94
January 1, 1984		49.43	101.20	306.27	416.82	492.46	951.76
January 1, 1985							
Winter		32.61	69.86	270.72	406.09	505.02	1,121.17
Summer		27.68	57.12	210.15	314.98	389.46	863.02
January 1, 1986							
Winter		39.88	85.41	330.88	496.34	617.24	1,370.28
Summer		33.84	69.84	256.88	385.03	476.05	1,054.93
January 1, 1987							
Winter		42.70	91.45	354.27	531.43	660.87	1,467.15
Summer		36.24	74.78	275.04	412.26	509.72	1,129.53
January 1, 1988							
Winter		44.29	94.87	367.56	551.38	685.69	1,522.26
Summer		37.59	77.58	285.36	427.72	528.83	1,171.89

NOTES: Based on data for the Montana Power Company.
Beginning in 1985, data is based on rates during utility-specified winter and summer periods.

SOURCE: Federal Power Commission, *Typical Electric Bills*, annual reports for 1975-76; U.S. Department of Energy, Energy Information Administration, *Typical Electric Bills*, annual reports for 1977-88 (EIA-0040).

TABLE 2.9
TYPICAL MONTHLY ELECTRIC BILLS FOR INDUSTRIAL SERVICE, 1975-88
(dollars)

Billing Demand:	75 kW	75 kW	150 kW	150 kW	300 kW	300 kW	500 kW	500 kW	1,000 kW	1,000 kW	5,000 kW	5,000 kW
Consumption:	15 MWh	30 MWh	30 MWh	60 MWh	60 MWh	120 MWh	100 MWh	200 MWh	200 MWh	400 MWh	1,500 MWh	2,500 MWh
Date												
January 1, 1975	339	500	583	850	1,049	1,517	1,671	2,407	3,226	4,632		
January 1, 1976	339	500	583	850	1,049	1,517	1,671	2,407	3,226	4,632		
January 1, 1977	339	500	583	850	1,049	1,517	1,671	2,407	3,226	4,632		
January 1, 1978	410	605	706	1,029	1,270	1,836	2,022	2,912	3,902	5,602		
January 1, 1979	413	630	721	1,096	1,314	1,992	2,105	3,186	4,082	6,172		
January 1, 1980			725	1,102	1,321	2,002	2,116	3,203	4,104	6,204	25,145	35,285
January 1, 1981			862	1,310	1,571	2,380	2,516	3,808	4,878	7,375	29,891	41,945
January 1, 1982			849	1,291	1,548	2,346	2,479	3,752	4,807	7,267	29,453	41,330
January 1, 1983			1,056	1,604	1,924	2,915	3,081	4,663	5,974	9,033	36,608	51,370
January 1, 1984			1,039	1,579	1,893	2,870	3,033	4,590	5,880	8,891	36,033	50,563
January 1, 1985												
Winter			1,312	2,041	2,614	4,072	4,350	6,779	8,689	13,548	55,551	79,843
Summer			982	1,590	1,948	3,162	3,235	5,259	6,452	10,501	42,313	62,555
January 1, 1986												
Winter			1,603	2,495	3,194	4,977	5,315	8,286	10,617	16,559	67,889	97,600
Summer			1,201	1,943	2,380	3,866	3,953	6,429	7,885	12,836	51,719	76,477
January 1, 1987												
Winter			1,717	2,671	3,420	5,328	5,691	8,872	11,367	17,730	72,688	104,499
Summer			1,285	2,081	2,548	4,139	4,232	6,883	8,442	13,744	55,377	81,886
January 1, 1988												
Winter			1,781	2,771	3,548	5,529	5,904	9,205	11,794	18,396	64,331	91,360
Summer			1,334	2,159	2,644	4,294	4,391	7,141	8,759	14,260	48,669	71,192

NOTES: Based on data for the Montana Power Company.
Beginning in 1985, data is based on rates during utility-specified winter and summer periods.
Energy is metered on secondary side of utility-owned transformers.

SOURCE: Federal Power Commission, *Typical Electric Bills*, annual reports for 1975-76; U.S. Department of Energy, Energy Information Administration, *Typical Electric Bills*, annual reports for 1977-88 (EIA-0040).

COAL

3

HIGHLIGHTS

- One-quarter of the U.S. demonstrated reserve base of coal is in Montana. This includes 57 percent of the subbituminous coal and 35 percent of the lignite demonstrated reserve base.

- Surface mines in Montana produced 38,920,381 tons of subbituminous coal and lignite in 1988, up 13 percent from the previous year.

- Rosebud County is the leading coal-producing county in Montana. Rosebud County produced 19,940,573 tons of coal in 1988, followed closely by Big Horn County with 16,841,029 tons.

- The 1988 average mine price for Montana coal was $11.59 per ton, down $.77 per ton from the previous year.

- Approximately 76 percent of the coal mined in Montana is shipped out of state to steam-electric plants. In 1987 one-third of the coal mined was shipped to utilities in Michigan.

- Of the 10.8 million tons of coal consumed in Montana in 1988, 98 percent was used to generate electricity.

TABLE 3.1
DEMONSTRATED RESERVE BASE[1] OF COAL BY RANK
January 1, 1988
(million short tons)

State	Anthracite	Bituminous	Subbituminous	Lignite	TOTAL
Alabama		3,866.2		1,083.0	4,949.2
Alaska		697.5	5,432.3	14.0	6,143.9
Arizona		297.1			297.1
Arkansas	104.1	287.8		25.7	417.5
Colorado	25.5	8,940.2	3,914.7	4,189.9	17,070.2
Georgia		3.2			3.2
Idaho		4.4			4.4
Illinois		78,537.0			78,537.0
Indiana		10,284.0			10,284.0
Iowa		2,191.7			2,191.7
Kansas		980.3			980.3
Kentucky, Eastern[2]		9,636.0			9,636.0
Kentucky, Western[2]		20,557.1			20,557.1
Louisiana				498.9	498.9
Maryland		773.6			773.6
Michigan		127.7			127.7
Missouri		6,016.7			6,016.7
Montana		1,385.4	102,961.01	15,762.9	120,109.3
New Mexico	2.3	1,990.6	2,551.4		4,544.3
North Carolina		10.7			10.7
North Dakota				9,737.5	9,737.5
Ohio		18,616.3			18,616.3
Oklahoma		1,596.0			1,596.0
Oregon			17.5		17.5
Pennsylvania	7,064.4	22,402.7			29,467.1
South Dakota				366.1	366.1
Tennessee		879.0			879.0
Texas				13,534.0	13,534.0
Utah		6,253.2	1.1		6,254.3
Virginia	125.5	2,752.4			2,877.9
Washington		303.7	1,125.5	8.1	1,437.2
West Virginia		37,929.4			37,929.4
Wyoming		4,418.1	64,241.4		68,659.4
U.S. TOTAL	**7,321.7**	**241,737.8**	**180,244.9**	**45,219.9**	**474,524.4**

[1] Includes measured and indicated resource categories as defined by the Energy Information Administration and represents 100 percent of the coal in place.

[2] Eastern Kentucky is in the Appalachian coal producing region; western Kentucky is in the U.S. interior coal producing region. Because coal reserves are calculated by region, these figures are shown separately.

NOTE: The coal reserve base consists of coal in the ground that was considered to be technically and economically minable on January 1, 1988. The amount of coal that can be recovered from the reserve base is termed the reserve. Recoverability ranges from 40 to 90 percent, depending on the characteristics of the coalbed, the mining method, and restraints imposed on the mining operations by natural and manmade features and restrictions. On a national basis, at least half of the coal reserve base, more than 200 billion tons, was estimated to be recoverable.

State geological and mineral resource surveys and other geological reports were used to update the U.S Department of Energy, Energy Information Administration's *Demonstrated Reserve Base of Coal in the United States on January 1, 1980* (EIA-0280). The update accounts for (1) depletion due to mining, (2) revisions based on new data sources determined to be suitable under demonstrated reserve base (DRB) criteria, and (3) adjustments using existing data sources in context with changes in DRB criteria or basic data interpretations.

SOURCE: U.S. Department of Energy, Energy Information Administration, *Coal Production*, annual report for 1987 (EIA-0118).

TABLE 3.2
COAL PRODUCTION BY COMPANY, 1978-88
(short tons)

Company	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988
Beartooth Coal Company[1]		715	7,321								
Coal Creek Mining Company	8,245	29,866	64,398	64,142	16,608						
Decker Coal Company[2] East Decker Mine		5,897,433	5,576,607	5,350,113	4,914,970	5,040,018	5,019,186	5,191,701	5,397,476	4,042,597	3,655,067
West Decker Mine	9,167,638	7,067,372	5,616,695	5,331,626	4,884,920	5,308,799	5,278,365	6,149,987	6,706,592	6,355,523	7,068,653
Knife River Coal Company[3]	288,708	305,143	305,578	204,492	171,556	206,543	236,954	212,654	252,754	290,264	227,603
Morrison-Knudsen Company, Inc. (Westmoreland Resources)	4,549,558	4,949,759	4,905,262	4,450,296	4,158,578	3,868,844	3,621,544	3,112,595	2,028,595	1,858,315	3,304,822
P.M. Coal Company	9,877	10,749	11,189	7,404	15,141	11,655	15,865	21,400	23,915	14,495	15,542
Peabody Coal Company	2,080,414	2,457,633	2,964,359	3,193,570	2,891,428	2,571,861	3,945,865	3,336,907	2,594,306	3,234,538	3,788,137
Red Lodge Coal Company										900	
Spring Creek Coal Company (NERCO)			118,660	4,368,885	1,352,181	2,102,606	2,962,008	2,837,037	4,664,238	6,557,228	4,704,442
Storm King Coal Mining Company[4]	8,984	9,464	8,571	8,165	8,062	5,896	16,379	3,251			
Blaine Warburton (owner)									276	305	248
Western Energy Company	10,565,750	11,725,558	10,401,972	10,352,966	9,424,857	9,544,062	11,957,724	12,275,351	12,074,698	12,022,894	16,155,867
TOTAL	**26,679,174**	**32,453,692**	**29,980,612**	**33,331,659**	**27,838,301**	**28,660,284**	**33,053,890**	**33,140,883**	**33,742,850**	**34,377,059**	**38,920,381**

1 Underground mine.
2 Production for 1978 is reported as the West Decker Mine.
3 Lignite mine.
4 Prior to a change in ownership in June 1987, this was called the Divide Coal Mining Company.

SOURCE: Montana Department of Labor and Industry, Workers' Compensation Division (1978-88).

TABLE 3.3
COAL PRODUCTION BY COUNTY, 1950-88
(short tons)

Year	Big Horn	Carbon	Cascade	Custer	Dawson	Fallon	Garfield	McCone
1950		198,781	21,306	5,618	7,657		563	1,646
1951		152,095	18,106	2,447	7,657	93	500	
1952		122,771	2,278	1,441	6,326		413	
1953		56,942	1,086	940	4,579			
1954		19,716	2,225	1,080	3,006			59
1955		20,017	1,252	233	3,780			
1956		17,025	2,132		1,819			25
1957		15,053	2,095		2,734			965
1958		10,906	1,816		2,393			513
1959		12,814	1,923		2,502			279
1960		11,085	1,650		1,920			366
1961		9,962	1,477		1,313			1,091
1962		11,363	1,444		1,242			468
1963		12,514	570		1,477			335
1964		12,023			987			316
1965		25,684			1,217			142
1966		52,811			767			254
1967					770			196
1968					266			163
1969					160			165
1970	74,856				744			229
1971					127			
1972	792,949				340			
1973	4,159,287				242			
1974	8,332,038				373			
1975	13,331,433							
1976	14,291,542							
1977	14,768,368							
1978	13,628,587							
1979	18,001,299	545						
1980	16,066,363	2,650						
1981	19,571,777	16						
1982	15,352,986	2						
1983	16,370,281							
1984	16,879,502							
1985	17,484,672							
1986	18,840,040							
1987	17,358,295							
1988	16,841,029							

TABLE 3.3 (continued)
COAL PRODUCTION BY COUNTY, 1950-88
(short tons)

Year	Musselshell	Powder River	Prairie	Richland	Rosebud	Sheridan	Valley	STATE TOTAL
1950	523,582	3,838	851	12,072	1,708,869	8,882	156	**2,493,821**
1951	593,030	3,772	1,950	12,956	1,488,300		329	**2,281,235**
1952	502,533	2,573	1,213	14,589	1,406,321	6,862	99	**2,067,419**
1953	370,745	1,273	900	10,478	1,421,140			**1,868,083**
1954	345,474	2,160	213	10,156	1,083,311	7,406		**1,474,806**
1955	366,086			1,444	795,955	7,541		**1,196,308**
1956	347,126	1,858	336	5,420	952,080	6,601		**1,334,422**
1957	199,652	2,557	614	1,527	164,311	5,195		**394,703**
1958	220,606	4,711	307	76,218	19,241	2,125		**338,836**
1959	135,117	1,517	313	177,972		5,429		**337,866**
1960	91,819	820		188,820		4,793		**301,273**
1961	75,060	1,760		264,108		4,077		**358,848**
1962	48,565	2,080		297,013		3,675		**365,850**
1963	31,044	2,258		285,697		2,653		**336,548**
1964	31,836	2,535		294,463		2,476		**344,636**
1965	47,592	2,107		298,315		2,191		**377,248**
1966	32,752	1,787		325,348		1,691		**415,410**
1967	33,481	2,128		326,757		1,177		**364,509**
1968	31,637	1,853		329,022	192,029	301		**555,271**
1969	30,540	2,047		306,833	685,140			**1,024,885**
1970	26,675	3,053		321,908	3,089,693			**3,517,158**
1971	112,252	2,660		325,475	6,656,612			**7,097,126**
1972	46,460	1,727		320,975	7,101,954			**8,264,405**
1973	29,837	1,444		312,785	6,225,424			**10,729,019**
1974	20,669	1,001		329,590	5,440,384			**14,124,055**
1975	16,524	1,862		300,053	8,511,226			**22,161,098**
1976	15,709	1,614		314,814	11,662,052			**26,285,731**
1977	15,727	16,015		311,390	12,117,552			**27,229,052**
1978	18,478	8,246		302,062	12,641,342			**26,598,715**
1979		29,875		303,528	14,203,545			**32,538,792**
1980	20,321	64,399		304,712	13,379,283			**29,837,728**
1981	8,165			203,886	13,571,946			**33,355,790**
1982	23,118	16,627		173,695	12,355,653			**27,922,081**
1983	16,737			210,763	12,141,044			**28,738,825**
1984	32,245			229,119	15,844,946			**32,985,812**
1985	21,895			211,655	15,616,857			**33,335,079**
1986	23,915			237,220	14,674,254			**33,775,429**
1987	14,948			276,923	15,286,376			**32,936,542**
1988	15,408			224,834	19,940,573			**37,021,844**

SOURCE: Montana Department of Revenue, Property Assessment Division (1950-80); Montana Department of Revenue, Natural Resources and Corporation Tax Division (1981-88).

TABLE 3.4
AVERAGE MINE PRICE OF COAL BY COUNTY, 1950-88
(dollars per short ton)

Year	Big Horn	Carbon	Cascade	Custer	Dawson	Fallon	Garfield	McCone
1950		4.77	6.47	3.23	3.00		3.00	2.04
1951		5.00	1.43	3.00	2.48	2.00	2.00	
1952		5.04	9.59	3.95	2.00		2.00	
1953		5.47	10.90	4.00	2.00			
1954		7.48	6.80	4.13	3.00			3.00
1955		3.50	8.06	1.00	1.00			
1956		7.25	6.90		1.10			1.12
1957		7.50	7.30		1.00			1.00
1958		7.56	7.75		1.00			1.00
1959		7.53	7.55		1.00			1.00
1960		7.45	7.67		1.00			1.00
1961		7.66	7.82		1.00			2.16
1962		7.69	7.79		1.00			3.59
1963		8.08	7.74		1.00			1.88
1964		8.26			1.00			1.75
1965		6.76			1.00			4.00
1966		6.49			1.00			3.08
1967					1.00			3.51
1968					1.00			4.96
1969					1.00			1.00
1970	4.62				1.00			3.57
1971					1.00			
1972	3.47				1.00			
1973	3.93				1.00			
1974	4.53				1.00			
1975	5.68							
1976	6.69							
1977	6.89							
1978	8.23							
1979	13.56	20.99						
1980	13.29	21.03						
1981	13.88	20.69						
1982	16.63	21.00						
1983	16.81							
1984	16.92							
1985	16.19							
1986	14.26							
1987	15.06							
1988	15.80							

TABLE 3.4 (continued)
AVERAGE MINE PRICE OF COAL BY COUNTY, 1950-88
(dollars per short ton)

Year	Musselshell	Powder River	Prairie	Richland	Rosebud	Sheridan	Valley	STATE AVERAGE
1950	4.50	2.00	2.00	3.52	1.32	3.00	3.00	2.34
1951	4.14	2.00	2.00	3.39	1.65		3.50	2.54
1952	4.35	2.00	2.00	2.49	1.98	3.30	3.50	2.76
1953	4.75	3.00	3.00	3.80	2.00			2.66
1954	4.25	3.00	3.00	4.09	2.00	3.50		2.62
1955	4.60			3.00	2.00	3.55		2.83
1956	4.95	1.10	1.10	4.30	1.95	3.56		2.83
1957	5.38	1.00	1.00	4.33	2.95	3.58		4.35
1958	4.03	1.00	1.00	1.96	2.83	5.57		3.55
1959	5.44	1.00	1.00	1.93		3.80		3.59
1960	6.40	1.00		1.94		3.80		3.56
1961	6.32	1.00		1.93		3.93		3.04
1962	4.24	1.00		1.92		4.00		2.45
1963	6.29	1.00		1.92		4.00		2.57
1964	6.58	1.00		1.92		4.00		2.58
1965	6.47	1.00		1.93		4.32		2.83
1966	6.98	1.00		1.94		4.31		2.91
1967	7.07	1.00		1.95		4.50		2.42
1968	7.58	1.00		1.95	1.63	4.50		2.15
1969	8.08	1.00		2.02	1.81			2.07
1970	6.73	1.00		2.12	1.68			1.82
1971	4.29	1.00		2.25	1.73			1.79
1972	5.41	6.00		2.43	1.83			2.03
1973	9.31	7.13		2.58	2.06			2.83
1974	6.62	9.41		3.39	2.80			3.84
1975	10.00	10.00		5.02	3.85			4.97
1976	18.31	9.74		6.35	4.49			5.72
1977	20.84	7.86		6.92	4.48			5.83
1978	22.21	11.71		7.80	5.25			6.82
1979		8.70		8.60	6.17			10.28
1980	26.80	7.94		10.60	6.96			10.43
1981	27.94			12.30	8.52			11.69
1982	29.74	10.73		12.95	9.60			13.51
1983	30.26			12.67	10.44			14.10
1984	26.70			14.05	9.73			13.46
1985	30.00			14.37	8.36			12.52
1986	30.00			13.75	9.70			12.29
1987	30.00			13.30	9.25			12.36
1988	33.50			13.35	7.99			11.59

NOTE: In each county average price was calculated by dividing the gross value of production by the total production for that county during the year in which the coal was mined.

SOURCE: Montana Department of Revenue, Property Assessment Division (1950-80); Montana Department of Revenue, Natural Resources and Corporation Tax Division (1981-88).

TABLE 3.5
COAL PRODUCTION AND AVERAGE MINE PRICE BY RANK OF COAL, 1950-87

Year	PRODUCTION (thousand short tons)			AVERAGE MINE PRICE (dollars per short ton)		
	Subbituminous	Lignite	TOTAL	Subbituminous	Lignite	TOTAL
1950	2,468	52	2,520	2.30	3.37	2.33
1951	2,310	35	2,345	2.61	3.51	2.63
1952	2,039	31	2,070	2.80	3.70	2.81
1953	1,848	25	1,873	2.64	3.77	2.66
1954	1,491	NA	NA	2.79	NA	NA
1955	1,217	30	1,247	3.01	3.82	3.03
1956	820	26	846	4.11	3.70	4.10
1957	387	26	413	5.33	3.80	5.23
1958	211	94	305	5.94	2.34	4.84
1959	152	193	345	7.06	2.08	4.28
1960	113	200	313	6.87	2.06	3.79
1961	97	274	371	6.76	2.01	3.26
1962	78	304	382	6.90	1.99	2.98
1963	53	290	343	7.51	1.95	2.82
1964	46	300	346	7.40	1.95	2.68
1965	63	301	364	7.24	1.96	2.88
1966	91	328	419	7.10	1.96	3.08
1967	65	300	365	NA	NA	NA
1968	189	330	519	3.12	1.89	2.33
1969	722	308	1,030	2.18	2.03	2.13
1970	3,124	323	3,447	1.83	2.13	1.86
1971	6,737	327	7,064	1.79	2.27	1.82
1972	7,899	322	8,221	2.01	2.45	2.02
1973	10,411	314	10,725	2.83	2.60	2.82
1974	13,775	331	14,106	3.91	3.00	3.90
1975	21,620	520	22,140	5.06	5.04	
1976	25,919	312	26,231	NA	NA	4.90
1977	29,020	300	29,320	NA	NA	5.30
1978	26,290	310	26,600	NA	NA	7.37
1979	32,343	333	32,676	w	w	9.76
1980	29,578	369	29,948	w	w	10.50
1981	33,341	204	33,545	w	w	12.14
1982	27,708	174	27,882	w	w	13.57
1983	28,713	211	28,924	w	w	14.22
1984	32,771	229	33,000	w	w	13.57
1985	33,075	212	33,286	w	w	13.18
1986	33,741	237	33,978	w	w	12.93
1987	34,123	277	34,399	w	w	12.43

NA Not available.

w Withheld to avoid disclosure of individual company data.

SOURCES: U.S. Bureau of Mines (1950-76); U.S. Department of Energy, Energy Information Administration (1977-78); U.S. Department of Energy, Energy Information Administration, *Coal Production*, annual reports for 1979-87 (EIA-0118).

TABLE 3.6
RECEIPTS OF MONTANA COAL AT ELECTRIC UTILITY PLANTS,[1] 1973-87
(thousand short tons)

Year	RECEIVED AT MONTANA UTILITIES			Received at Out-of-State Utilities	TOTAL
	Subbituminous	Lignite	Montana Total		
1973			**882.0**	9,741.0	**10,623.0**
1974			**822.0**	13,114.0	**13,936.0**
1975			**1,197.0**	20,180.0	**21,377.0**
1976			**2,316.0**	22,642.0	**24,958.0**
1977			**3,223.0**	22,730.0	**25,954.0**
1978	3,033.0	298.3	**3,331.3**	22,976.0	**26,307.3**
1979	3,207.0	303.9	**3,510.9**	24,612.8	**28,123.7**
1980	3,071.0	292.8	**3,363.8**	24,560.9	**27,924.7**
1981	3,129.0	210.1	**3,339.1**	26,633.8	**29,972.9**
1982	2,424.0	177.1	**2,601.1**	25,439.2	**28,040.3**
1983	1,804.0	206.4	**2,010.4**	25,755.7	**27,766.1**
1984	4,822.8	200.2	**5,023.0**	27,432.2	**32,455.2**
1985	5,292.0	168.0	**5,460.0**	25,975.1	**31,435.1**
1986	7,308.0	190.1	**7,498.1**	22,991.7	**30,489.8**
1987	7,376.0	219.6	**7,595.6**	24,606.9	**32,202.5**

[1] Plants of 25-megawatt capacity or larger (1973-82).
Plants of 50-megawatt capacity or larger (1983-87).

SOURCES: Federal Energy Regulatory Commission (formerly the Federal Power Commission), Form 423 (1973-77); U.S. Department of Energy, Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants*, annual reports for 1978-87 (EIA-0191).

TABLE 3.7
DESTINATION OF MONTANA COAL DELIVERED TO STEAM-ELECTRIC PLANTS,[1] 1978-87
(thousand short tons)

State of Destination	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987
Arizona									19.7	
Illinois	5,688.2	4,106.4	3,693.5	2,669.0	2,145.6	2,841.0	1,999.2	2,487.1	3,036.5	2075.5
Indiana	1,202.0	813.0	1,157.0	735.0	1,504.0	1,063.0	1,318.0	1,231.0	1,384.0	985.0
Iowa	223.6	180.4	207.3	256.6	213.4	132.7				
Kansas		5.8								
Kentucky	50.4									
Michigan	3,309.0	3,727.0	3,426.0	5,398.0	3,702.5	5,700.0	6,698.7	6,874.1	8,162.5	10,705.8
Minnesota	10,007.1	11,449.5	10,737.7	10,664.4	10,038.7	9,010.0	10,868.5	9,974.8	6,138.0	6,889.0
Montana	**3,331.3**	**3,510.9**	**3,363.8**	**3,339.1**	**2,601.1**	**2,010.4**	**5,023.0**	**5,460.0**	**7,498.1**	**7,595.6**
Nebraska			41.4						.1	.5
North Dakota		3.3								
Texas		1,609.0	2,722.7	4,385.4	5,372.7	4,594.6	4,209.8	3,173.1	2,178.0	2,311.3
Wisconsin	2,495.7	2,718.5	2,575.3	2,525.4	2,462.3	2,414.4	2,338.0	2,235.0	2,072.9	1,639.8
TOTAL	**26,307.3**	**28,123.7**	**27,924.7**	**29,972.9**	**28,040.3**	**27,766.1**	**32,455.2**	**31,435.1**	**30,489.8**	**32,202.5**

[1] Plants 25-megawatts or greater (1978-82); Plants 50-megawatts or greater (1983-87)

SOURCE: U.S. Department of Energy, Energy Information Administration, *Cost and Quality of Fuels for Electric Utility Plants*, annual reports for 1978-87 (EIA-0191).

TABLE 3.8
DISTRIBUTION OF COAL FOR USE IN MONTANA, 1974-88
(thousand short tons)

Year	Electric Utilities	Residential and Commercial	Industrial	TOTAL
1974	843	9	55	**907**
1975	1,203	7	42	**1,252**
1976	2,452	5	108	**2,565**
1977	3,225	1	182	**3,408**
1978	3,334	4	183	**3,522**
1979	3,513	3	214	**3,731**
1980	3,462	14	182	**3,658**
1981	3,318	7	253	**3,578**
1982	2,619	9	197	**2,824**
1983	3,058	8	120	**3,186**
1984	4,979	6	153	**5,138**
1985	5,625	8	220	**5,852**
1986	8,094	22	317	**8,433**
1987	7,603	8	180	**7,791**
1988	10,556	9	230	**10,795**

SOURCES: U. S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, *Bituminous Coal and Lignite Distribution*, annual reports for 1974-76; U. S. Department of Energy, Energy Information Administration, *Bituminous Coal and Lignite Distribution*, quarterly reports for 1977; U. S. Department of Energy, Energy Information Administration, *Bituminous Coal and Lignite Distribution*, annual report for 1978 (EIA-0125); U. S. Department of Energy, Energy Information Administration, *Bituminous and Subbituminous and Lignite Distribution*, annual report for 1979 (EIA-0125); U. S. Department of Energy, Energy Information Administration, *Coal Distribution*, annual reports for 1980-88 (EIA-0125).

NATURAL GAS

4

HIGHLIGHTS

- Proved reserves of natural gas were estimated by the U.S. Department of Energy to be 801 billion cubic feet as of December 31, 1987.
- Montana wells produced 53 billion cubic feet of natural gas in 1988, up 11 percent from the previous year.
- In 1988 the state's natural gas utilities reported sales of 35 billion cubic feet. Approximately three-fourths of this was used by residential and commercial customers.
- Residential gas customers paid an average of $4.41 per thousand cubic feet (Mcf) while commercial customers paid an average of $4.34 per Mcf and industrial customers paid an average of $3.42 per Mcf in 1987. The state-wide average over all consuming sectors was $4.16 per Mcf.
- The average residential customer consumed 91,000 cubic feet of natural gas at a cost of $404 in 1987.

NOTE: All volumetric data presented in Chapter 4 are expressed using a pressure base of 14.73 pounds per square inch absolute (psia) at 60 degrees Fahrenheit. Conversions to this uniform pressure base were made by the Energy Division, Montana Department of Natural Resources and Conservation, where necessary.

TABLE 4.1
YEAR-END NATURAL GAS PROVED RESERVES, 1950-79
(thousand cubic feet)

Year	Nonassociated	Associated or Dissolved	Underground Storage	TOTAL GAS
1950	718,722	69,839	4,470	**793,031**
1951	696,554	119,533	7,522	**823,609**
1952	693,916	119,631	9,562	**823,109**
1953	612,965	117,937	28,949	**759,851**
1954	573,496	116,183	30,122	**719,801**
1955	560,565	125,067	30,178	**715,810**
1956	546,049	115,906	30,614	**692,569**
1957	512,583	119,311	34,914	**666,808**
1958	508,851	132,295	37,163	**678,309**
1959	492,162	128,880	40,835	**661,877**
1960	462,532	105,362	54,883	**622,777**
1961	435,178	104,319	53,601	**593,098**
1962	419,128	98,958	82,085	**600,171**
1963	399,266	103,558	95,307	**598,131**
1964	384,278	99,287	106,704	**590,269**
1965	373,440	103,672	118,740	**595,852**
1966	383,346	102,239	134,765	**620,350**
1967	550,681	138,454	148,583	**837,718**
1968	579,572	174,266	157,695	**911,533**
1969	799,770	147,927	162,511	**1,110,208**
1970	793,283	141,854	164,786	**1,099,923**
1971	715,195	127,032	182,334	**1,024,561**
1972	790,660	92,628	180,748	**1,064,036**
1973	821,513	85,625	185,311	**1,092,449**
1974	676,749	81,272	143,239	**901,260**
1975	686,350	73,912	169,724	**929,986**
1976	876,452	67,435	162,383	**1,106,270**
1977	815,862	67,428	160,692	**1,043,982**
1978	768,683	65,779	157,206	**991,668**
1979	807,645	63,483	164,963	**1,036,091**

NOTE: Proved reserves are the estimated amounts of natural gas that geologic and engineering data indicate are recoverable from known reservoirs under present economic and operating conditions. Natural gas is classified into two categories based on type of occurrence in reservoirs, as follows:

1. Nonassociated gas is defined as free natural gas not in contact with crude oil in the reservoir.
2. Associated or dissolved gas is the combined volume of natural gas that occurs in crude oil reservoirs either as free gas (associated) or as gas in solution with the crude oil (dissolved).

Since 1973, only the recoverable portion of natural gas in underground storage has been reported.

Joint American Gas Association, Canadian Petroleum Association, and American Petroleum Institute publication of the yearly reserves of natural gas and natural gas liquids ceased after 1979. Rather than develop independent reserve estimates, these organizations now publish the reserve estimates calculated by the U.S. Department of Energy, which are shown in Table 4.1A.

SOURCE: American Gas Association, *Gas Facts* (1950-79).

TABLE 4.1A
YEAR-END PROVED RESERVES OF NATURAL GAS AND NATURAL GAS LIQUIDS, 1976-87

Year	Total Natural Gas (wet after lease separation)[1] (billion cubic feet)	Nonassociated Natural Gas (wet after lease separation)[2] (billion cubic feet)	Associated Dissolved Natural Gas (wet after lease separation)[2] (billion cubic feet)	(Dry) Natural Gas[1] (billion cubic feet)	Natural Gas Liquids (million barrels)
1976		761	45	806	
1977	887	838	49	887[3]	
1978	926	893	33	926	12
1979	837	786	51	825	10
1980	1,308[3]	1,186	122	1,287[3]	16
1981	1,336[3]	1,247	89	1,321[3]	11
1982	870	789	81	847	18
1983	921	813	108	896	19
1984	825	748	77	802	18
1985	884	793	91	857	21
1986	823	725	98	803	16
1987	801	704	97	780	16

[1] Volumes for 1977 and 1978 were neither fully dry nor fully wet.

[2] Reported on a dry basis prior to 1979.

[3] Estimate is associated with a sampling error (95 percent confidence interval) that exceeds 20 percent of the estimated value.

SOURCES: U.S. Department of Energy, Energy Information Administration, *U.S. Crude Oil and Natural Gas Reserves*, annual reports for 1977-78 (EIA-0216); U.S. Department of Energy, Energy Information Administration, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, annual reports for 1979-87 (EIA-0216).

The 1976 data appear in the 1977 annual report.

TABLE 4.2
PRODUCTION AND AVERAGE WELLHEAD PRICE[1] OF NATURAL GAS, 1950-88

Year	Production[2] (million cubic feet)	Production[3] (million cubic feet)	Average Wellhead Price[3] (cents per thousand feet)
1950	39,708	39,010	5.0
1951	39,038	36,123	5.3
1952	30,409	27,939	5.7
1953	31,779	28,592	6.3
1954	31,150	29,765	6.0
1955	30,468	30,227	5.2
1956	29,356	28,350	6.1
1957	32,979	31,413	6.0
1958	31,327	27,689	6.5
1959	31,585	30,551	6.0
1960	35,381	30,411	6.8
1961	34,884	32,407	6.4
1962	28,973	29,417	6.1
1963	27,113	25,504	6.6
1964	25,234	23,592	6.6
1965	27,873	26,285	6.5
1966	32,414	29,041	8.1
1967	31,619	29,276	7.9
1968	31,917	28,831	8.8
1969	41,229	37,804	7.2
1970	37,445	35,225	8.1
1971	38,137	28,775	8.2
1972	35,606	32,171	10.0
1973	58,896	56,383	15.9
1974	51,401	41,753	25.2
1975	44,546	41,664	39.4
1976	45,098	42,449	44.0
1977	48,181	45,245	72.0
1978	47,140	46,759	83.7
1979	53,888	54,969	120.2
1980	53,802	53,520	143.6
1981	50,073	48,654	190.0
1982	50,932	48,338	210.2
1983	52,426	48,423	240.3
1984	52,981	48,500	249.4
1985	54,151	45,794	232.9
1986	48,245	41,281	215.3
1987	47,845	40,231	177.9
1988	53,014		

[1] Average wellhead price is computed by dividing the gross value of the gas produced by the volume produced

NOTE: Oil and Gas Conservation Division production data are based on reports by gas producers, which exclude gas vented or flared and gas used in repressuring. Production equals the U.S. Department of the Interior, Bureau of Mines marketed production, except that some gas withdrawn from storage facilities in Montana may be included in the Oil and Gas Conservation Division data.

Department of Revenue data are based on tax receipts received from industry.

[2] SOURCE: Montana Department of Natural Resources and Conservation, Oil and Gas Conservation Division, *Annual Review*, 1950-88.

[3] SOURCE: Montana Department of Revenue, Property Assessment Division (1950-81); Montana Department of Revenue, Research and Information Division (1982-87).

TABLE 4.3
SALES OF NATURAL GAS, 1950-87

Year	SALES (trillion BTU)					
	Residential	Commercial	Industrial	Electric Generation	Other	Total
1950	12.3	5.9	12.9		1.7	**32.7**
1951	12.5	6.7	15.0		1.7	**35.9**
1952	12.3	7.1	15.4		2.9	**37.7**
1953	12.1	7.0	15.5		1.7	**36.3**
1954	13.4	7.7	14.1		1.7	**36.9**
1955	15.4	8.7	17.6		1.8	**43.5**
1956	15.8	9.0	18.8		1.8	**45.4**
1957	17.0	9.6	18.4		1.9	**46.9**
1958	16.3	9.1	19.3		1.9	**46.6**
1959	18.9	10.8	16.6		2.2	**48.5**
1960	18.5	11.0	19.8		2.0	**51.3**
1961	18.7	11.5	20.8		2.1	**53.1**
1962	19.4	12.0	21.9		2.2	**55.5**
1963	19.0	11.7	24.4		2.2	**57.3**
1964	21.1	13.2	26.6		2.4	**63.3**
1965	22.6	14.4	28.0		2.5	**67.4**
1966	22.0	14.2	28.2		2.5	**66.9**
1967	21.9	14.7	25.3		2.6	**64.4**
1968	22.4	14.6	26.6		2.7	**66.2**
1969	23.7	15.5	32.2		2.7	**74.1**
1970	23.5	15.4	36.4		3.5	**78.8**
1971	24.4	15.9	35.6		3.0	**79.0**
1972	25.9	16.9	36.7		3.3	**82.8**
1973	24.7	16.3	36.5		4.2	**81.7**
1974	23.8	15.7	36.1		3.1	**78.7**
1975	26.3	17.6	32.6		3.3	**79.8**
1976	23.9	16.0	28.3		2.9	**71.0**
1977	23.2	15.6	24.3		2.6	**65.8**
1978	24.4	16.5	21.4		2.7	**65.1**
1979	25.0	17.1	19.9		2.8	**64.8**
1980	20.5	14.4	16.6		2.7	**54.1**
1981	18.3	12.6	15.5		1.9	**48.2**
1982	21.2	14.6	11.6		2.1	**49.5**
1983	18.0	12.1	10.9		1.9	**43.0**
1984	19.6	13.1	8.8	0.1	1.9	**43.4**
1985	20.7	13.9	7.0	0.3	2.1	**44.0**
1986	17.8	11.5	6.2	[1]	1.8	**37.3**
1987	16.8	10.6	6.0	[1]	1.4	**34.7**

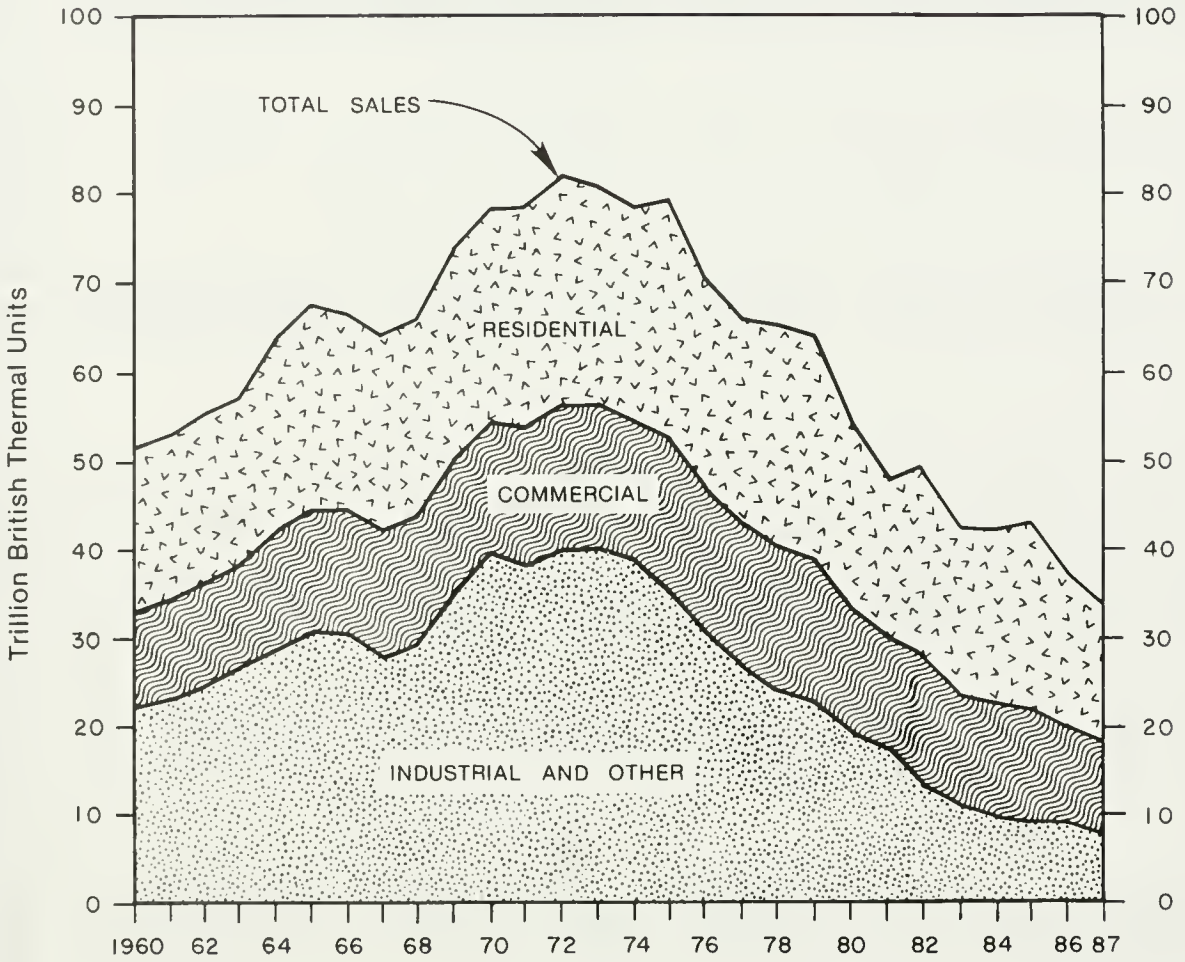
NOTE: These data cover sales of natural gas by utilities only and do not include sales directly from producer to end-user. In the United States direct sales make up a significant portion of total gas use, particularly in the industrial sector. In Montana, direct sales are not significant; hence, "total sales" is close to "total gas delivered." Prior to 1984 electric utility use of gas is included in the industrial sector.

Average heat content is highly variable, depending on elevation. Natural gas data converted to Btu, as in this table, are, therefore, only a rough approximation.

[1] Less than 0.05 trillion Btu.

SOURCE: American Gas Association, *Gas Facts* (1950-87).

FIGURE 4.1 SALES OF NATURAL GAS BY CONSUMING SECTOR, 1960-87



SOURCE: Table 4.3.

TABLE 4.4
AVERAGE PRICES OF NATURAL GAS, 1950-87

Year	AVERAGE PRICE (cents per million BTU)					
	Residential	Commercial	Industrial	Electric Generation[1]	Other	Total
1950	36.9	27.0	30.3		5.9	31.0
1951	49.7	35.8	17.2		22.9	32.3
1952	51.6	37.0	21.4		20.5	34.1
1953	52.7	37.8	21.6		23.9	35.2
1954	52.6	38.7	22.3		24.2	36.8
1955	52.0	38.3	22.4		24.1	36.1
1956	51.0	37.7	21.8		24.2	35.1
1957	57.4	41.8	25.0		24.9	40.2
1958	59.1	43.1	27.0		27.0	41.4
1959	58.9	43.5	27.6		27.6	43.3
1960	60.1	45.2	27.6		29.2	43.2
1961	59.8	44.5	27.9		26.9	42.7
1962	65.7	47.1	29.8		30.1	46.1
1963	68.9	49.6	31.6		33.0	47.6
1964	68.2	49.2	31.6		32.8	47.5
1965	63.0	49.3	31.1		32.1	47.4
1966	69.4	50.2	31.6		33.1	48.0
1967	71.7	51.9	34.0		33.1	50.9
1968	75.4	55.7	33.0		32.9	52.3
1969	79.9	59.0	33.4		35.3	53.7
1970	84.2	62.1	33.6		36.1	54.4
1971	84.6	62.7	33.4		37.7	55.3
1972	87.1	64.5	34.4		39.4	57.2
1973	97.5	73.0	41.3		45.2	64.7
1974	102.0	88.0	57.0		58.0	76.0
1975	118.0	102.0	92.0		88.0	103.0
1976	150.0	130.0	124.0		123.0	134.0
1977	169.0	148.0	153.0		147.0	157.0
1978	205.0	178.0	169.0		175.0	185.0
1979	222.0	196.0	225.0		209.0	215.0
1980	288.0	293.0	317.0		380.0	303.0
1981	355.0	385.0	427.0		449.0	390.0
1982	422.0	460.0	549.0		492.0	466.0
1983	438.0	479.0	561.0		504.0	484.0
1984	460.0	501.0	516.0	541.0	487.0	485.0
1985	451.0	479.0	495.0	76.0	443.0	464.0
1986	421.0	428.0	394.0	[2]	385.0	417.0
1987	408.0	405.0	336.0	[2]	360.0	393.0

NOTE: Average heat content is highly variable, depending on elevation. Natural gas data converted to Btu, as in this table, are, therefore, only a rough approximation.

[1] Electric generation was included in the industrial sector prior to 1984.

[2] Less than 0.05 trillion Btu in sales.

SOURCE: American Gas Association, *Gas Facts* (1950-87).

TABLE 4.5
SALES[1] OF NATURAL GAS BY GAS UTILITIES, 1950-88
(million cubic feet)

Year	MONTANA POWER COMPANY[2]					MONTANA-DAKOTA UTILITIES[3]				
	Residential and Commercial	Industrial	Other	Total	% of Total Montana Sales	Residential and Commercial	Industrial	Other	Total	% of Total Montana Sales
1950	7,909	8,852	NA	16,761	54	4,228	240	469	4,937	16
1951	8,076	12,970	NA	21,046	59	5,514	1,180	499	7,193	20
1952	8,435	13,760	NA	22,195	62	7,340	1,845	468	9,653	27
1953	8,229	13,624	NA	21,853	62	7,223	1,863	480	9,566	27
1954	8,737	12,225	NA	20,962	59	7,912	1,649	495	10,056	28
1955	11,231	15,511	NA	26,742	64	7,594	1,996	533	10,123	24
1956	11,100	15,584	NA	26,684	63	7,708	2,212	509	10,429	25
1957	12,584	15,527	NA	28,111	64	7,797	2,056	492	10,345	24
1958	12,391	15,173	NA	27,564	63	7,429	3,233	551	11,213	26
1959	14,401	12,629	NA	27,030	60	8,678	2,934	507	12,119	27
1960	14,533	15,462	NA	29,995	62	8,516	3,148	342	12,006	25
1961	14,517	16,654	NA	31,171	63	8,689	3,606	177	12,472	25
1962	15,133	18,080	NA	33,213	64	9,148	3,051	103	12,302	24
1963	14,893	19,666	NA	34,559	65	8,826	3,862	79	12,767	24
1964	16,853	20,958	NA	37,811	64	9,620	4,687	55	14,362	24
1965	17,977	22,195	NA	40,172	64	10,955	4,430	61	15,446	24
1966	17,731	23,058	NA	40,789	65	10,414	4,256	55	14,725	24
1967	18,027	20,766	NA	38,793	64	10,584	3,813	67	14,464	24
1968	19,063	21,650	NA	40,713	65	10,847	4,523	65	15,435	24
1969	19,891	25,536	NA	45,427	64	11,534	6,277	55	17,866	25
1970	20,398	26,006	NA	46,404	63	11,499	8,582	102	20,183	27
1971	18,956	25,581	1,628	46,165	63	11,612	8,317	139	20,068	27
1972	20,068	26,128	1,491	47,687	62	12,352	8,218	600	21,170	28
1973	19,771	25,915	1,578	47,264	62	11,525	8,685	1,415	21,623	28
1974	18,931	26,301	1,408	46,640	63	11,230	8,455	588	20,273	28
1975	20,762	24,130	1,523	46,415	62	12,779	7,774	NA	20,553	28
1976	18,795	20,663	1,405	40,863	61	12,208	7,100	NA	19,307	29
1977	18,413	18,101	1,451	37,965	61	11,898	5,923	NA	17,821	29
1978	18,696	17,280	1,498	37,475	60	13,784	3,981	NA	17,765	29
1979	19,142	16,118	2,737	37,997	62	13,500	3,480	NA	16,981	28
1980	17,091	12,655	4,986	34,733	63	11,332	3,627	NA	14,959	27
1981	15,216	9,758	2,754	27,727	58	10,312	5,307	NA	15,618	32
1982	17,032	7,064	1,317	25,413	54	12,228	4,148	60	16,436	35
1983	14,606	6,829	1,152	22,587	55	10,181	3,774	32	13,987	34
1984	16,075	5,967	1,238	23,280	56	10,744	2,451	59	13,254	32
1985	16,916	6,043	1,271	24,230	58	11,094	1,336	19	12,449	30
1986	14,461	5,208	1,099	20,768	59	9,191	607	15	9,813	28
1987	14,090	5,358	748	20,196	63	7,712	254	15	7,981	25
1988	15,027	6,652	732	22,411	63	8,391	363	16	8,770	25

TABLE 4.5 (continued)

Year	GREAT FALLS GAS COMPANY[4]					OTHER UTILITIES[5]		TOTAL SALES[6]			
	Residential and Commercial	Industrial	Other	Total	% of Total Montana Sales	Total for all Sectors	% of Total Montana Sales	Residential and Commercial	Industrial	Other	Total
1950	2,509	208	53	2,770	9	6,481	21	21,127	9,300	522	**30,949**
1951	2,697	311	191	3,199	9	4,055	11	20,342	14,461	690	**35,493**
1952	2,566	228	333	3,127	9	852	2	19,193	15,833	801	**35,827**
1953	2,478	238	350	3,066	9	814	2	18,744	15,725	830	**35,299**
1954	2,795	255	400	3,450	10	892	2	20,336	14,129	895	**35,360**
1955	3,284	243	434	3,961	9	1,049	2	23,158	17,750	967	**41,875**
1956	3,361	204	396	3,961	9	1,019	2	23,188	18,000	905	**42,093**
1957	3,510	258	451	4,219	10	955	2	24,846	17,841	943	**43,630**
1958	3,365	268	475	4,108	9	1,067	2	24,252	18,674	1,026	**43,952**
1959	4,048	388	566	5,002	11	1,175	2	28,302	15,951	1,073	**45,326**
1960	3,928	512	516	4,956	10	1,152	2	28,129	19,122	858	**48,109**
1961	4,067	380	606	5,053	10	1,045	2	28,318	20,640	783	**49,741**
1962	4,092	371	752	5,215	10	1,078	2	29,451	21,502	855	**51,808**
1963	4,030	396	793	5,219	10	945	2	28,694	23,924	872	**53,490**
1964	4,446	480	847	5,773	10	1,018	2	31,937	26,125	902	**58,964**
1965	4,767	499	868	6,134	10	1,160	2	34,859	27,124	929	**62,912**
1966	4,593	490	846	5,929	9	1,125	2	33,863	27,804	901	**62,568**
1967	4,505	397	856	5,758	10	1,160	2	34,276	24,976	923	**60,175**
1968	4,504	424	852	5,780	9	1,074	2	35,488	26,597	917	**63,002**
1969	5,042	412	891	6,345	9	1,118	2	37,585	32,225	946	**70,756**
1970	4,926	378	902	6,206	8	1,010	1	37,833	34,966	1,004	**73,803**
1971	4,901	367	895	6,163	8	1,048	1	36,517	34,265	2,662	**73,444**
1972	5,185	353	884	6,422	8	1,105	1	38,710	34,699	2,975	**76,384**
1973	4,729	414	864	6,007	8	982	1	37,007	35,014	3,857	**75,876**
1974	4,504	412	807	5,723	8	936	1	35,601	35,168	2,803	**73,572**
1975	5,145	354	845	6,344	8	1,000	1	39,686	32,258	2,368	**74,312**
1976	4,875	237	892	6,004	9	762	1	36,640	28,000	2,297	**66,936**
1977	4,317	246	734	5,297	8	715	1	35,343	24,270	2,185	**61,798**
1978	4,818	196	826	5,840	9	824	1	38,122	21,457	2,324	**61,904**
1979	4,512	249	750	5,512	9	804	1	37,958	19,847	3,487	**61,294**
1980	3,888	266	689	4,842	9	669	1	32,980	16,548	5,675	**55,203**
1981	3,257	169	619	4,044	8	573	1	29,358	15,234	3,373	**47,962**
1982	3,289E	188E	627E	4,104E	9	596	1	33,145E	11,460E	1,944E	**46,549E**
1983	3,320	206	636	4,162	10	446	1	28,553	10,809	1,820	**41,182**
1984	3,531	256	530	4,317	10	487	1	30,837	8,674	1,827	**41,338**
1985	3,719	181	536	4,436	11	474	1	32,203	7,560	1,826	**41,589**
1986	3,538	285	592	4,415	12	465	1	27,655	6,100	1,706	**35,461**
1987	3,064	193	442	3,699	11	388	1	25,254	5,805	1,205	**32,264**
1988	3,189	170	499	3,858	11	386	1	26,993	7,185	1,247	**35,425**

NA Not available.

E Estimate.

TABLE 4.5 (continued)

[1] Sales to other utilities for resale and sales of natural gas to Canada are not included.

[2] From 1950 to 1970, government and municipal sales were reported in the "Residential and Commercial" sector.

"Other" includes interdepartmental use, sales to government and municipal authorities for heating, and special off-line sales to firms in Montana where these figures are reported separately.

[3] Prior to 1975 "Other" includes interdepartmental use and natural gas used in MDU's electric generating plants at Baker, Glendive, and Miles City. Company consumption and unbilled customer consumption as part of a lease agreement at Saco are not included.

The 1975-81 data uses slightly different sector definitions; as a result, consumption in the "Other" sector is not shown separately for these years.

Since 1982 "Other" includes interdepartmental sales.

[4] "Other" includes sales to Malmstrom Air Force Base and other public authorities.

[5] "Other Utilities" includes the following companies (listed in approximate descending order by volume of sales):

Cut Bank Gas Company:	Supplies natural gas to Cut Bank; approximately 80 percent of its gas is purchased from the Montana Power Company.
Shelby Gas Association:	Supplies natural gas to Shelby; gas is purchased from the Montana Power Company.
Consumers Gas Company:	Supplies natural gas to Sunburst and Sweetgrass; gas is purchased from the Montana Power Company and the J.R. Bacon Drilling Company through the Treasure State Pipeline Company.
Saco Municipal Gas Service:	Supplies natural gas to Saco from the town's own wells.

Some of the smaller natural gas utilities have experienced problems measuring actual sales volumes. Therefore, the figures for these utilities should be considered estimates.

[6] All gas sales from "Other Utilities" are included under "Residential and Commercial."

The definition of "Other" varies from utility to utility and from year to year, as indicated.

NOTE: Source documents from the Public Service Commission often report data at sales pressure rather than at a uniform pressure base. When necessary, the data were converted to the uniform pressure base of 14.73 psia at 60 degrees Fahrenheit using Boyle's law.

The source reports are for the companies' fiscal years ending during the year shown. Because reporting years vary from utility to utility, the data represent various twelve-month periods and are, in that sense, not strictly comparable.

The Saco Municipal Gas Service and the Cut Bank Gas Company have reporting years ending June 30. The Shelby Gas Association's reporting year ends September 30. The Consumer Gas Company, the Montana Power Company, and Montana-Dakota Utilities use calendar year reporting periods.

The Great Falls Gas Company used a calendar year reporting period through 1981; they filed a six-month report for the period January 1, 1982, through June 30, 1982, and then changed to a twelve-month reporting period ending June 30.

Through 1981, Great Falls Gas Company figures are based on reports for the twelve months ending December 31 of that year. The 1982 figures were estimated by the sector averages from the 1981 and 1983 twelve-month reports. The 1983 figures and those for all subsequent years are based on twelve-month reports ending June 30 of that year.

SOURCE: Annual reports filed with the Montana Public Service Commission by the natural gas utilities (1950-88), supplemented by information obtained directly from the utilities.

TABLE 4.6
NATURAL GAS PRODUCTION AND CONSUMPTION, 1950-87
(million cubic feet)

Year	Gross Withdrawal[1]	Marketed Production[2]	Consumption[3]	GAS DELIVERED					
				Residential	Commercial	Industrial[4]	Electric Utilities	Other Consumers[5]	TOTAL
1950	40,975	38,972	38,333	12,596	7,536	13,979	892	NA	35,002
1951	36,897	36,225	37,276	12,287	7,379	15,047	884	NA	35,598
1952	29,140	28,557	41,545	12,263	7,794	17,422	998	NA	38,476
1953	28,245	27,736	40,953	12,029	7,544	16,559	1,237	NA	37,368
1954	30,532	30,087	41,002	13,314	8,277	14,909	601	NA	37,101
1955	28,841	28,100	47,861	15,335	9,427	18,240	630	NA	43,631
1956	26,852	25,706	48,305	15,235	9,314	18,226	876	NA	43,651
1957	30,830	28,481	54,868	16,725	10,116	18,429	2,954	NA	48,224
1958	30,830	27,836	54,725	14,970	9,546	18,960	3,183	NA	46,659
1959	32,819	30,575	51,898	17,310	11,124	16,438	1,005	NA	45,877
1960	37,792	33,235	54,271	16,825	11,820	19,558	339	NA	48,543
1961	36,798	33,716	57,465	17,086	12,140	21,404	354	NA	50,985
1962	32,621	29,791	62,952	17,078	12,302	21,713	3,692	NA	54,785
1963	31,228	29,862	66,969	17,274	12,569	24,613	3,285	NA	57,740
1964	26,653	25,050	67,282	18,792	13,059	26,419	2,437	NA	60,706
1965	29,800	28,105	70,895	19,908	14,110	28,310	1,992	NA	64,320
1966	36,048	30,685	73,829	19,690	14,068	29,571	2,977	NA	66,306
1967	31,610	25,866	65,782	19,756	13,090	22,584	502	2,426	58,358
1968	32,229	19,313	63,642	19,711	11,529	23,155	631	2,122	57,148
1969	68,064	41,229	78,988	21,463	14,239	31,917	1,520	2,354	71,493
1970	48,302	42,705	90,823	24,794	15,520	36,105	2,529	3,044	81,992
1971	38,136	32,720	89,021	25,379	15,734	36,800	1,075	2,375	81,363
1972	38,137	33,474	85,161	23,787	16,521	33,192	1,218	2,630	77,348
1973	60,931	56,175	91,148	24,923	16,786	37,898	2,322	2,357	84,286
1974	59,524	54,873	80,766	21,590	14,353	35,202	1,111	2,249	74,505
1975	44,547	40,734	80,351	24,097	16,233	31,631	1,059	2,421	75,441
1976	45,097	42,563	78,094	23,525	15,490	31,049	709	2,341	73,114
1977	48,181	46,819	70,956	21,596	14,626	27,260	953	2,080	66,515
1978	48,497	46,522	72,649	22,944	15,548	26,686	909	2,218	68,305
1979	56,094	53,888	69,805	22,579	15,255	20,411	2,320	2,141	62,706
1980	53,802	51,867	60,724	19,296	13,612	16,717	4,182	653	54,460
1981	58,502	56,565	52,452	17,245	12,572	15,494	2,069	1,153	48,533
1982	58,184	56,517	52,208	19,989	15,987	11,574	337		47,887
1983	53,516	51,967	46,249	16,967	13,534	11,798	335		42,634
1984	52,930	51,474	46,864	18,443	14,256	9,855	360		42,914
1985	54,151	52,494	47,265	19,371	14,820	8,220	468		42,879
1986	48,246	46,592	41,148	16,822	12,536	7,507	407		37,272
1987	47,845	46,456	38,786	15,359	10,989	7,861	478		34,687

[1] Gross Withdrawal is defined as marketed production, plus quantities used in repressuring, plus quantities vented and flared from both gas wells and oil wells.

[2] Marketed Production represents gross withdrawals of natural gas from gas and oil wells, less gas used for repressuring, nonhydrocarbon gases removed, and quantities vented and flared.

For 1979 and prior years, the volumes of nonhydrocarbon gases included in marketed production were not reported For 1980 and 1981, the amount of nonhydrocarbon gases removed was not available for the Montana data, so DOE used the same figure for Montana's marketed production including nonhydrocarbon gases as is used for marketed production excluding nonhydrocarbon gases.

[3] Consumption is defined as total gas delivered to consumers, plus lease and plant fuel, plus pipeline fuel.

[4] Industrial use includes refinery use of gas, but excludes pipeline fuel.

[5] Other Consumers includes delivery to municipalities and public authorities for institutional heating, street lighting, etc. This category was not used before 1967; it was included in Industrial Consumption before that year. This category was merged with the Commercial category in 1982.

SOURCES. U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, *Natural Gas Production and Consumption*, annual reports for 1950-75; U.S. Department of Energy, Energy Information Administration, *Natural Gas Production and Consumption*, annual reports for 1976-79 (EIA-0131); U.S. Department of Energy, Energy Information Administration, *Natural Gas Annual*, annual reports for 1980-87 (EIA-0131).

TABLE 4.7
AVERAGE ANNUAL NATURAL GAS PRICES,[1] 1950-87
(cents per thousand cubic feet)

Year	Wellhead[2]	Retail[3]	DELIVERED			
			Residential	Commercial	Industrial	All Consumers
1950	5.3	28.7	47.3	32.8	14.2	30.1
1951	5.5	31.3	51.0	35.1	16.0	32.0
1952	6.1	31.8	50.7	35.2	19.2	32.4
1953	5.9	32.9	53.1	36.8	19.4	33.7
1954	6.8	37.5	58.9	41.5	20.1	38.8
1955	6.7	36.7	58.3	41.1	20.2	38.0
1956	6.8	36.8	58.5	41.2	20.6	38.2
1957	7.2	36.9	58.3	41.3	20.8	38.0
1958	6.8	38.4	64.7	44.3	21.8	40.1
1959	7.5	41.6	64.7	45.7	26.7	45.6
1960	7.1	41.6	66.0	46.4	27.4	45.4
1961	7.4	40.3	65.5	45.9	25.7	43.8
1962	7.4	41.9	75.2	50.6	25.1	46.4
1963	7.5	41.3	74.6	50.7	26.8	46.2
1964	7.8	45.7	76.3	53.3	30.3	49.5
1965	8.2	46.8	78.1	54.1	31.1	50.6
1966	8.3	45.8	77.9	54.3	30.4	49.5
1967	8.4	49.9	79.6	57.1	34.1	54.6
1968	9.1	50.9	82.2	60.3	32.6	55.4
1969	10.2	52.2	88.2	64.3	33.8	56.2
1970	10.3	52.9	90.7	65.9	33.9	57.2
1971	12.1	56.3	93.4	68.5	35.7	60.3
1972	12.3	58.7	96.5	69.1	38.1	63.0
1973	23.6	66.1	108.6	80.4	42.5	69.8
1974	25.3	75.8	111.9	92.6	58.0	80.4
1975	43.3	104.6	129.6	110.1	94.9	108.9
1976	44.5	111.7	136.4	118.7	93.0	116.4
1977	71.9	157.6	181.6	158.4	155.8	164.1
1978	84.7	166.1	189.4	164.6	164.2	172.0
1979	121.1	188.9	221.3	200.2	174.9	200.4
1980	145.4	296.7	305.3	311.7	314.3	318.2
1981	190.9	386.9	375.4	413.8	425.8	405.7
1982	214.5	464.1	446.0	487.4	548.8	482.9
1983	241.0	441.4	462.7	506.5	399.0	456.1
1984	246.0	483.9	486.1	524.2	517.3	502.5
1985	239.0	461.8	481.3	509.4	470.6	484.5
1986	205.0	411.1	444.6	447.6	391.3	431.2
1987	180.0	NA	441.0	434.0	342.0	416.0

[1] Average prices were computed by dividing the annual value of natural gas by the annual volume of natural gas.

[2] Average wellhead prices were computed using the marketed production figure for natural gas.

In 1980 Montana reported the value associated with gross withdrawals to DOE and, thus, the average value of the gross withdrawal volume was used as the average wellhead value. This is probably the case in other years as well.

[3] Average retail prices were computed using the consumption figure for natural gas.

NOTE: Other Consumers were included in the Industrial category prior to 1967. From 1967 to 1981, Other Consumers were not reported separately, but were included in the overall average figure shown in the All Consumers category. Other Consumers are included in the Commercial category beginning in 1982.

Data from electric utilities are not shown separately but are included in the All Consumers category.

SOURCES: U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, *Natural Gas Production and Consumption*, annual reports for 1950-75; U.S. Department of Energy, Energy Information Administration, *Natural Gas Production and Consumption*, annual reports for 1976-79 (EIA-0131); U.S. Department of Energy, Energy Information Administration, *Natural Gas Annual*, annual reports for 1980-87 (EIA-0131).

TABLE 4.8
CAPACITY AND PRODUCTION OF NATURAL GAS PROCESSING PLANTS, 1961-87

As of Dec. 31 of the Year	Number of Plants	INPUT (million cubic feet per day)		AVERAGE PRODUCTION (gallons per day)							
		Gas Capacity	Gas Throughput	Propane	Isobutane	Normal or Unsplit Butane	Liquefied Petroleum Gas Mix	Raw Natural Gas Liquid Mix	Debutanized Natural Gasoline	Other	TOTAL PRODUCTS
1961	2	66.2	32.0	8,000	—	8,600	—	39,400	—	—	56,000
1962	2	65.8	27.4	9,400	—	8,000	—	37,000	—	—	54,400
1963	2	65.8	21.9	6,100	—	6,400	—	32,200	—	—	44,700
1964	2	55.8	23.3	6,800	—	7,600	—	38,700	—	—	53,100
1965	2	55.8	24.3	3,700	—	8,900	—	38,400	—	—	51,000
1966	5	66.8	32.9	30,800	—	9,200	6,000	77,240	—	—	123,240
1967	5	360.9	272.9	23,325	—	9,000	25,370	47,155	—	—	104,850
1968	5	107.8	82.5	32,500	—	9,000	15,000	54,900	—	—	111,400
1969	4	68.8	57.0	37,500	—	9,000	15,000	75,000	—	—	136,500
1970	7	75.8	42.7	40,800	—	11,000	—	60,500	35,680	—	147,980
1971	6	73.3	40.3	33,550	—	9,400	6,000	59,400	9,590	—	117,940
1972	4	44.3	29.6	24,900	—	9,400	—	43,500	9,500	—	87,390
1973	4	44.3	21.3	28,727	—	6,026	17,000	13,576	—	—	65,329
1974	4	45.3	20.6	30,786	—	8,260	—	9,000	10,466	17,000	75,512
1975	4	44.3	26.1	31,200	—	9,100	—	9,000	8,350	16,000	73,650
1976	8	56.3	28.5	30,300	—	9,600	24,000	16,000	22,600	—	102,500
1977	6	53.5	30.6	20,800	—	12,200	17,000	16,600	10,500	—	77,100
1978	7	54.5	26.1	21,700	—	12,900	11,000	16,500	10,000	—	72,100
1979	8	62.9	28.3	26,800	—	11,200	—	43,700	—	—	81,700
1980	8	60.9	36.3	32,300	—	10,600	—	54,800	—	400	98,100
1981	9	58.8	35.5	27,800	—	7,900	10,000	50,500	—	800	97,000
1982	9	63.3	37.8	30,600	—	12,100	5,000	43,200	8,400	1,000	100,300
1983	8	58.0	36.6	32,200	—	16,500	7,100	38,500	—	1,500	95,800
1984	9	70.0	35.3	42,900	8,200	6,400	13,400	39,200	1,500	1,500	113,100
1985	9	70.0	38.1	45,800	1,900	8,500	22,600	29,900	8,600	2,700	120,000
1986	7	52.0	28.9	27,700	3,900	7,800	15,100	21,500	9,600	900	86,500
1987	6	22.0	8.2	23,800	2,200	—	22,100	25,000	2,100	800	76,000

NOTE: Since this compilation includes cycling plants reprocessing pipeline gas, totals shown here for gas throughput do not relate directly to government data on total gas processed or sold. Similarly, liquids production figures are based on yearly average and do not necessarily reconcile with government data.

SOURCE: *Oil and Gas Journal*, annual gas processing report issue (1961-87).

TABLE 4.9
PRODUCING GAS AND GAS CONDENSATE WELLS, 1966-87

Year	Number of Wells
1966	784
1967	648
1968	1,196
1969	1,098
1970	739
1971	1,056
1972	1,116
1973	1,118
1974	1,450
1975	1,235
1976	1,490
1977	1,438
1978	1,755
1979	1,881
1980	1,881
1981	2,140
1982	2,111
1983	2,133
1984	2,153
1985	2,260
1986	2,799
1987	2,349

SOURCES: U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, *Natural Gas Production and Consumption*, annual reports (1966-75); U.S. Department of Energy, Energy Information Administration, *Natural Gas Production and Consumption*, annual reports for 1976-79 (EIA-0131); U.S. Department of Energy, Energy Information Administration, *Natural Gas Annual*, annual reports for 1980-87 (EIA-0131).

TABLE 4.10
AVERAGE NATURAL GAS CONSUMPTION AND ANNUAL COST PER CONSUMER, 1980-87

Year	Sector	Consumption (thousand cubic feet)	Cost (dollars)
1980	Residential	117	356
	Commercial	670	2,089
	Industrial	32,841	103,218
1981	Residential	104	389
	Commercial	610	2,523
	Industrial	31,364	133,551
1982	Residential	121	538
	Commercial	780	3,800
	Industrial	24,013	131,770
1983	Residential	102	470
	Commercial	651	3,298
	Industrial	25,048	99,956
1984	Residential	110	534
	Commercial	679	3,558
	Industrial	21,013	108,703
1985	Residential	115	555
	Commercial	706	3,595
	Industrial	17,908	84,267
1986	Residential	100	445
	Commercial	597	2,672
	Industrial	16,869	66,006
1987	Residential	91	404
	Commercial	514	2,231
	Industrial	18,072	-

NOTE: Beginning in 1987 industrial costs per consumer are not calculated since values associated with gas delivered for the account of others are not available.

SOURCE: U.S. Department of Energy, Energy Information Administration, *Natural Gas Annual*, annual reports for 1980-87 (EIA-0131).

CRUDE OIL AND PETROLEUM PRODUCTS

5

HIGHLIGHTS

- Montana's proved reserve of crude oil was estimated by the U.S. Department of Energy to be 246 million barrels as of December 31, 1987. The Oil and Gas Conservation Division of the Montana Department of Natural Resources and Conservation estimated the reserves at 189 million barrels, three-fourths of which were located in the Williston Basin.

- Twenty-five million barrels of crude oil were extracted in 1987. This is 2 million less than in the previous year.

- The average wellhead price of oil was $16.62 per barrel in 1987, up 23 percent from the previous year.

- Montana refineries processed 43 million barrels of crude oil in 1987, up 1 percent from the previous year.

TABLE 5.1
YEAR-END PROVED RESERVES[1] OF CRUDE OIL, 1950-87
(thousand barrels)

Year	United States[2]	Montana[2]	United States[3]	Montana[3]
1950	25,268,398	111,272		
1951	27,468,031	108,418		
1952	27,960,554	156,181		
1953	28,944,828	208,985		
1954	29,560,746	272,394		
1955	30,012,170	298,948		
1956	30,434,649	331,414		
1957	30,300,405	319,991		
1958	30,535,917	337,799		
1959	31,719,347	309,268		
1960	31,613,211	266,687		
1961	31,758,505	250,909		
1962	31,389,223	248,860		
1963	30,969,990	271,253		
1964	30,990,510	251,620		
1965	31,352,391	274,145		
1966	31,452,127	281,608		
1967	31,376,670	307,972		
1968	30,707,117	345,117		
1969	29,631,862	275,765		
1970	39,001,335	241,529		
1971	38,062,957	228,185		
1972	36,339,408	241,248		
1973	35,299,839	219,343		
1974	34,249,956	207,389		
1975	32,682,127	163,968		
1976	30,942,166	152,670	33,502,000	181,000
1977	29,486,402	151,601	31,780,000	175,000
1978	27,803,760	140,466	31,355,000	158,000
1979	27,051,289	136,590	29,810,000	152,000
1980			29,805,000	179,000
1981			29,426,000	186,000
1982			27,858,000	216,000
1983			27,735,000	234,000
1984			28,446,000	224,000
1985			28,416,000	232,000
1986			26,889,000	248,000
1987			27,256,000	246,000

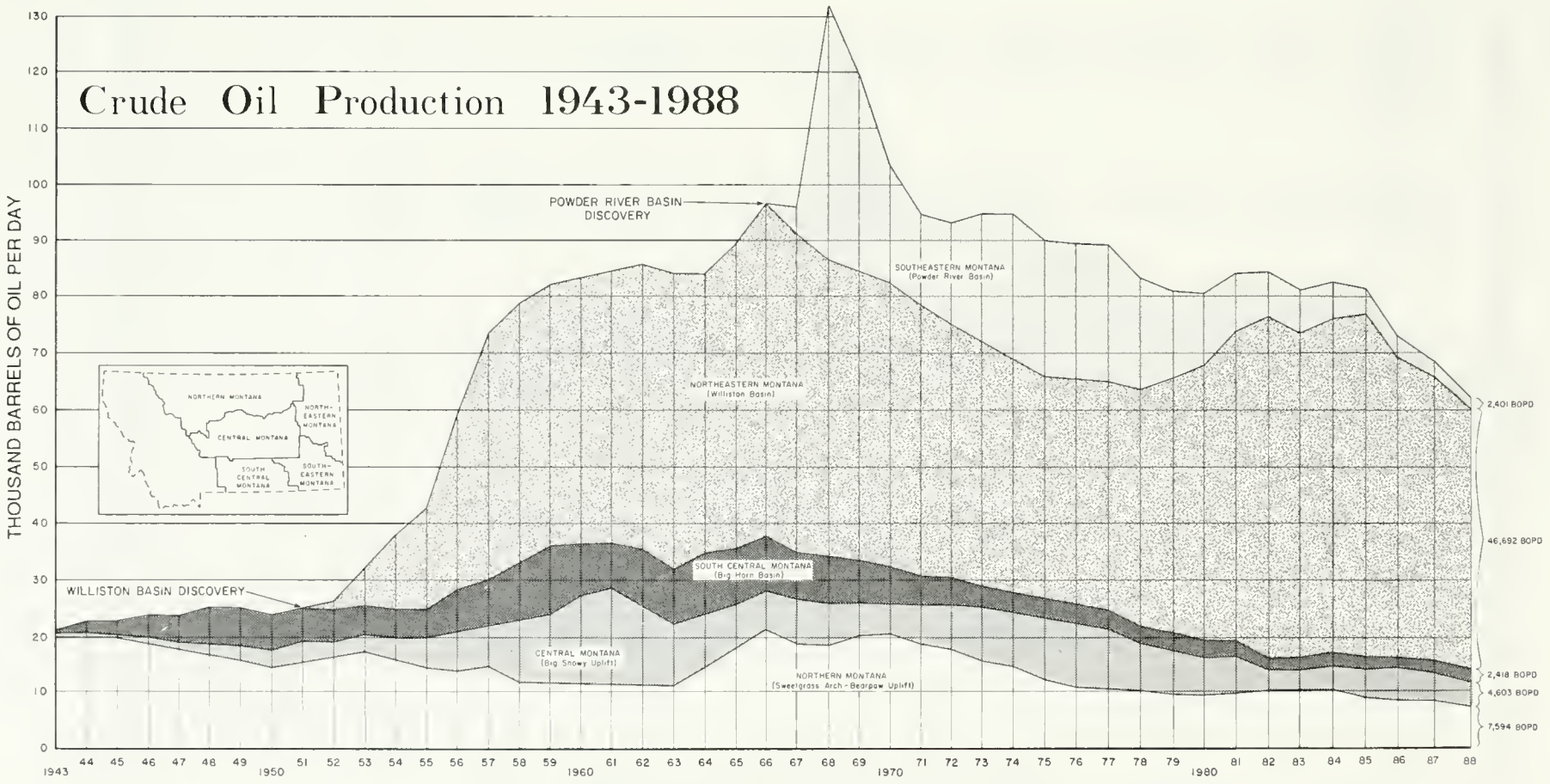
[1] Proved reserves are the estimated amount of oil that geologic and engineering data indicate is recoverable from known reservoirs under present economic and operating conditions.

NOTE: The American Gas Association (AGA) ceased making independent crude oil reserve estimates in 1979 Beginning in 1980, the AGA reported the reserve estimates calculated by DOE. Both DOE and AGA figures for 1976-79 are shown for comparison purposes.

[2]SOURCES: American Petroleum Institute (1950-76); American Gas Association, *Gas Facts*, 1977-79.

[3]SOURCES: U.S. Department of Energy, Energy Information Administration, *U.S. Crude Oil and Natural Gas Reserves*, annual reports for 1977-78 (EIA-0216); U.S. Department of Energy, Energy Information Administration, *U.S. Crude Oil, Natural Gas, and Natural Gas Liquids Reserves*, annual reports for 1979-87 (EIA-0216).

FIGURE 5.1 CRUDE OIL PRODUCTION, 1943-88



SOURCE: Montana Department of Natural Resources and Conservation, Oil and Gas Conservation Division, *Annual Review*, 1988.

TABLE 5.2
ESTIMATES OF CRUDE OIL PROVED RESERVES BY REGION, 1955-88
(thousand barrels)

As of Jan 1 of the Year	REGION[1]						
	North	South Central	Central	Southeast	Northeast	Miscellaneous	TOTAL[2]
1955							289,742
1956							333,782
1957							343,411
1958							321,566
1959							325,484
1960							297,993$_E$
1961							254,946
1962							334,074
1963							341,225
1964							371,929$_E$
1965	147,007	69,895	29,637		161,504		408,043
1966	144,281	61,516	38,668		163,101		407,566
1967	137,638	56,828	39,424		159,470		393,360
1968	128,131	53,366	37,820	64,417	168,760		452,494
1969	121,999	35,913	29,906	97,497	166,742		452,057
1970	115,782	33,995	27,085	84,534	168,385		429,781
1971	121,160	29,703	26,698	77,045	170,508		425,114
1972	114,369	29,036	28,518	71,183	171,235		414,341
1973	102,484	18,917	25,704	64,751	154,271		366,127
1974	91,421	14,394	29,651	56,670	141,864		334,000
1975	76,739	10,996	26,688	47,336	148,241		310,000
1976	47,619	10,336	32,957	38,629	125,459		255,000
1977	43,119	9,581	31,647	29,922	118,726		232,500
1978	41,133	9,916	30,671	38,272	113,011		233,000
1979	40,884	13,054	27,895	26,055	130,037	2,080	240,005
1980	38,079	12,225	25,133	24,261	132,216	4,086	236,000
1981	39,174	13,029	21,855	17,669	153,604	2,669	248,000
1982	25,678	5,204	17,051	15,519	139,618	10	203,080
1983	27,443	4,378	11,307	13,251	166,341	32	228,560
1984	25,159	8,655	12,291	17,184	146,562	68	209,807
1985	21,265	11,814	7,088	14,177	181,936		236,280
1986	19,006	12,114	5,848	11,278	160,823		208,861
1987	31,604	6,919	10,846	3,927	133,711	42	180,643
1988	26,587	7,542	9,428	3,017	142,172	105	188,557

E Two of the source publications were biennial rather than annual, and in each of these publications there was only one estimate of the crude oil reserves. Crude oil reserves for the two "missing" years have been interpolated from data values in the adjacent years.

1 The regions shown correspond to the following geological basins:

North	Sweetgrass Arch and Bearpaw Uplift
Northeast	Williston Basin
Central	Big Snowy Uplift
South Central	Big Horn Basin
Southeast	Powder River Basin

2 The Oil and Gas Division acknowledges discrepancies between the sum of the regional reserve estimates (where the region estimates are aggregates of individual field reserve estimates) and the reported statewide reserve estimate. However, these differences are only a very small proportion of the statewide estimate.

SOURCE: Montana Department of Natural Resources and Conservation, Oil and Gas Division, *Annual Review*, 1955-88.

TABLE 5.3
CRUDE OIL PRODUCTION AND AVERAGE WELLHEAD PRICES[1], 1950-87

Year	Production of Crude Oil[2] (thousand barrels)	Wellhead Price[2] (dollars per barrel)	Production of Crude Oil[3] (thousand barrels)	Wellhead Price[3] (dollars per barrel)	Production of Crude Oil[4] (thousand barrels)	Wellhead Price[4] (dollars per barrel)
1950	8,109	2.46		2.52	7,841	2.47
1951	8,958	2.37		2.47	8,814	2.35
1952	9,606	2.25		2.25	9,527	2.26
1953	11,920	2.18		2.18	11,793	2.23
1954	14,195	2.20		2.20	14,023	2.22
1955	15,654	2.26		2.26	16,548	2.18
1956	21,760	2.45		2.58	21,262	2.47
1957	27,122	2.66		2.70	26,658	2.43
1958	27,957	2.65		2.65	27,816	2.62
1959	29,857	2.53		2.56	29,985	2.50
1960	30,240	2.41		2.41	29,937	2.45
1961	30,906	2.42		2.42	30,499	2.42
1962	31,648	2.42		2.42	31,270	2.44
1963	30,870	2.44		2.44	30,364	2.44
1964	30,647	2.43		2.43	30,241	2.45
1965	32,778	2.43		2.43	32,089	2.44
1966	35,380	2.44		2.44	34,734	2.45
1967	34,959	2.50		2.50	34,316	2.50
1968	48,460	2.57		2.57	47,152	2.56
1969	43,954	2.69		2.69	44,446	2.76
1970	37,879	2.78		2.78	38,058	2.83
1971	34,599	3.01		3.01	34,625	3.05
1972	33,904	3.06	33,904	3.07	34,572	2.99
1973	34,620	3.33	34,620	3.33	34,584	3.85
1974	34,554	6.85	34,554	6.65	34,629	6.82
1975	32,844	7.83	32,844	7.83	32,815	7.83
1976	32,814	8.42	32,814	8.42	32,057	8.49
1977	32,680	8.63	32,680	8.58	30,696	9.07
1978	30,467	9.25	30,467	9.25	30,935	9.31
1979	29,957	12.39	29,957	12.39	30,286	13.00
1980	29,584	22.24	29,584	22.24	29,927	20.92
1981	30,813	34.73	30,813	34.69	30,518	34.48
1982	30,917	31.26	30,921	31.24	30,938	31.14
1983	29,665	28.79	29,225		29,320	28.74
1984	30,080	28.04	29,761		30,668	27.58
1985	29,934	25.23	29,768		30,227	25.21
1986	27,165	13.52	27,072		26,327	13.49
1987	25,104	16.62	25,059		23,201	16.56

[1] Average wellhead prices were computed by dividing the gross value of production by the number of barrels extracted.

[2] SOURCES: Montana Department of Natural Resources and Conservation, Oil and Gas Conservation Division, *Annual Review*, 1950-87. The Oil and Gas Division acknowledges a difference in its data for the amount of Montana oil available for refining in Montana (calculated as the amount of oil produced in Montana less the amount of Montana oil exported) and the amount of Montana oil delivered to refineries in Montana. Some of this oil is either used or lost at the various stages between producing and refining.

[3] U.S. Department of the Interior, Bureau of Mines, Mineral Industry Surveys, *Crude Petroleum, Petroleum Products, and Natural Gas Liquids*, annual reports for 1950-75; U.S. Department of Energy, Energy Information Administration, *Crude Petroleum, Petroleum Products, and Natural Gas Liquids*, annual reports for 1976-80 (EIA-0108); U.S. Department of Energy, Energy Information Administration, *Petroleum Supply Annual*, annual reports for 1981-87. DOE no longer publishes information on wellhead prices.

[4] Montana Department of Revenue, Property Assessment Division (1950-81); Montana Department of Revenue, Research and Information Division (1982), Montana Department of Revenue, Natural Resource and Corporation Tax Division (1983-87)

TABLE 5.4
TOTAL REFINERY RECEIPTS BY SOURCE OF CRUDE OIL, 1953-88
(thousand barrels)

Year	MONTANA		WYOMING		CANADA		NORTH DAKOTA		TOTAL[1]
	Crude Oil Refined in Montana	Percentage of Total	Crude Oil Refined in Montana	Percentage of Total	Crude Oil Refined in Montana	Percentage of Total	Crude Oil Refined in Montana	Percentage of Total	
1953	7,497	38.3	12,112	61.7	0	0.0			19,609
1954	9,034	45.4	10,865	54.5	0	0.0			19,909
1955	9,858	46.8	11,210	53.1	0	0.0			21,081
1956	9,053	39.6	13,720	60.0	88	0.4			22,861
1957	9,222	40.1	13,665	59.5	92	0.4			22,979
1958	9,165	39.4	14,089	60.5	12	0.1			23,265
1959	10,913	41.9	15,141	58.1	4	0.0			26,059
1960	10,531	42.3	14,383	57.7	21	0.1			24,935
1961	9,797	41.0	14,038	58.8	33	0.1			23,869
1962	11,175	39.7	16,708	59.4	266	0.9			28,149
1963	11,798	42.0	14,745	52.5	1,553	5.5			28,097
1964	12,292	38.4	15,714	49.1	4,002	12.5			32,007
1965	11,971	36.2	16,416	49.7	4,654	14.1			33,041
1966	10,626	31.8	18,120	54.2	4,684	14.0			33,429
1967	10,632	28.7	21,393	57.7	5,052	13.6			37,078
1968	9,690	23.7	20,915[r]	51.0	10,347[r]	25.2			40,951
1969	9,465	23.4	22,130[r]	54.7	8,843[r]	21.9			40,438
1970	9,080	21.5	19,342[r]	45.7	13,908[r]	32.8			42,330
1971	9,262	20.6	19,732[r]	43.8	16,003[r]	35.6			42,997
1972	8,194[r]	16.9	19,241[r]	39.6	21,156[r]	43.5			48,591[r]
1973	8,437[r]	16.6	18,235[r]	35.8	24,295[r]	47.7			50,967[r]
1974	7,989[r]	16.6	16,949[r]	35.3	23,115[r]	48.1			48,053
1975	8,002[r]	16.6	19,465[r]	40.4	20,690[r]	43.0			48,157[r]
1976	8,517	16.9	18,311	36.4	23,494	46.7			50,322
1977	8,928	18.5	18,248	37.8	20,921	43.3	200	0.4	48,297
1978	8,848	18.5	17,513	36.6	21,369	44.7	69	0.1	47,739
1979	8,668	17.1	18,368	36.3	23,578	46.6	6	0.0	50,620
1980	8,016	17.9	19,050	42.6	17,627	39.4	25	0.1	44,719
1981	8,691	22.4	18,298	47.2	11,797	30.4	14	0.0	38,801
1982	8,653[r]	20.5	18,178[r]	43.0	15,402	36.5			42,234
1983	7,120	16.9	19,183	45.7	15,584	37.2	45	0.1	41,932
1984	7,821	18.2	20,552	47.9	14,516	33.8	55	0.1	42,945
1985	7,804	19.0	17,258	41.9	16,075	39.1	10	0.0	41,149
1986	6,019	14.1	13,795	32.4	22,778	53.5			42,593
1987	4,993	11.6	13,758	31.9	24,396	56.5			43,147
1988	4,607	10.5	14,907	34.0	24,306	55.5			43,820

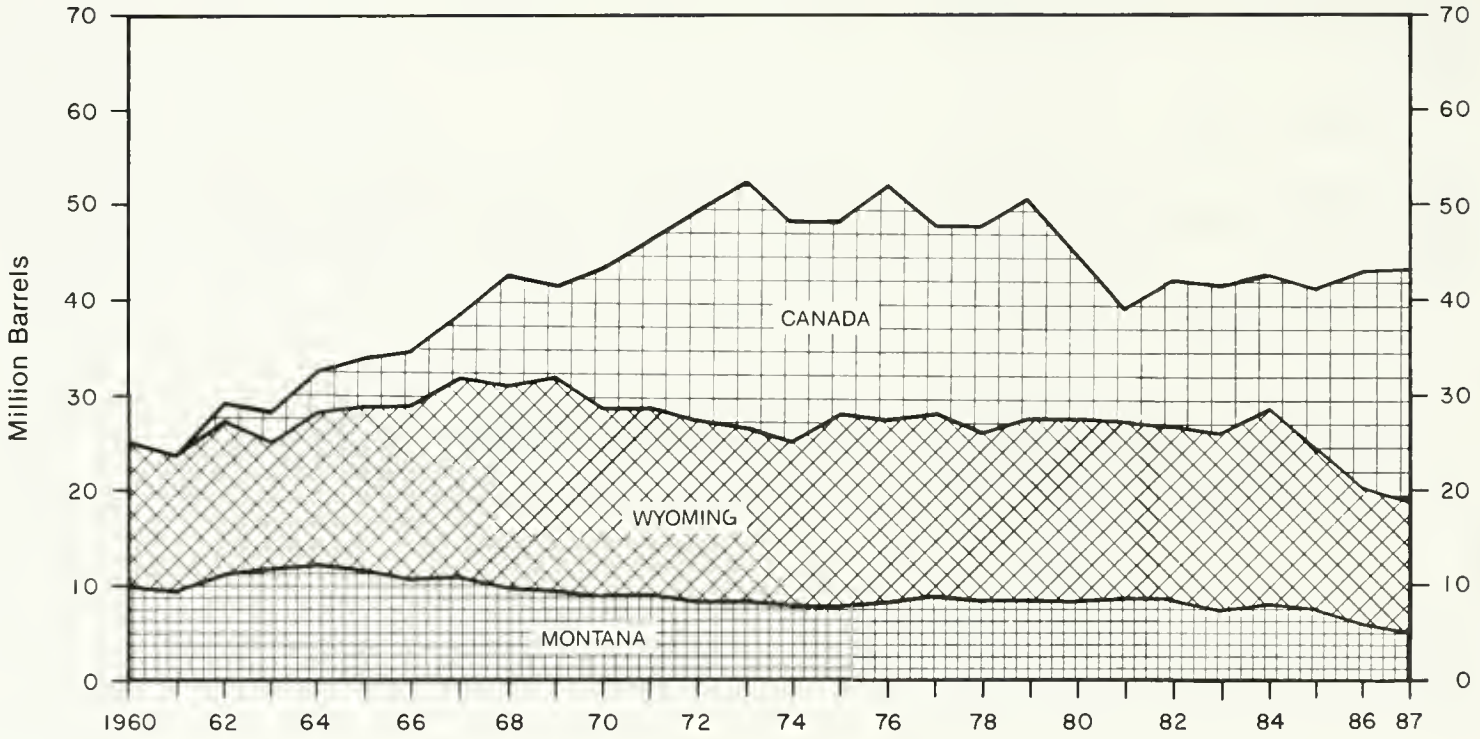
[r] Revised.

[1] Includes 9,000 barrels from South Dakota in 1954 and 13,000 barrels from South Dakota in 1955.

NOTE: Data originally reported by the Montana Oil and Gas Conservation Division have been revised on the basis of further information received from individual refineries. The Oil and Gas Conservation Division data originally understated Canadian inputs and overstated Wyoming inputs to the Continental Oil refinery, at least for the years 1968-75. Canadian inputs to the Big West Oil and Westco refineries were apparently not reported to the Oil and Gas Conservation Division. Revised data are available only for the years 1972-75, but it is likely that Canadian inputs to these two refineries were significant before 1972.

SOURCE: Montana Department of Natural Resources and Conservation, Oil and Gas Conservation Division, *Annual Review*, 1953-88.

FIGURE 5.2 REFINERY RECEIPTS BY SOURCE OF CRUDE OIL, 1960-87



NOTE: Crude oil received from North and South Dakota is not shown due to its small volume.

SOURCE: Table 5.4

TABLE 5.5
MOTOR FUEL USE, 1950-87
(thousand barrels)

Year	HIGHWAY USE OF MOTOR FUEL			Nonhighway Use of Motor Fuel	Losses Due to Evaporation, Handling, etc.	TOTAL CONSUMPTION OF MOTOR FUEL
	Gasoline	Diesel and LPG	Subtotal			
1950	4,027	181	4,208	1,262	83	**5,553**
1951	4,410	231	4,641	1,038	85	**5,764**
1952	4,482	295	4,777	1,370	92	**6,239**
1953	5,123	337	5,460	911	93	**6,464**
1954	4,870	405	5,275	1,401	96	**6,772**
1955	5,047	412	5,459	1,436	94	**6,989**
1956	5,569	421	5,990	1,271	103	**7,364**
1957	5,302	475	5,777	1,554	69	**7,400**
1958	5,703	513	6,216	1,193	70	**7,479**
1959	5,694	627	6,321	1,535	72	**7,928**
1960	5,772	648	6,420	1,666	75	**8,161**
1961	5,726	744	6,470	2,124	80	**8,674**
1962	6,525	722	7,247	986	87	**8,320**
1963	6,373	796	7,169	1,118	89	**8,376**
1964	6,504	840	7,344	1,016	86	**8,446**
1965	6,683	926	7,609	1,164	93	**8,866**
1966	7,063	1,030	8,093	970	90	**9,153**
1967	7,148	968	8,116	1,049	95	**9,260**
1968	7,654	1,089	8,743	967	96	**9,806**
1969	8,166	1,187	9,353	664	97	**10,114**
1970	8,397	1,384	9,781	944	101	**10,826**
1971	8,862	1,459	10,321	794	101	**11,216**
1972	9,393	1,646	11,039	1,004	104	**12,147**
1973	10,292	1,832	12,124	856	111	**13,091**
1974	9,810	1,737	11,547	758	106	**12,411**
1975	9,641	1,731	11,372	1,077	107	**12,556**
1976	10,693	2,073	12,765	1,099	119	**13,983**
1977	10,276	2,129	12,405	1,016	106	**13,526**
1978	12,170	2,389	14,559	908	124	**15,591**
1979	10,561	2,471	13,032	1,050	125	**14,207**
1980	9,917	2,348	12,265	971	111	**13,347**
1981	10,090	2,591	12,681	1,048	112	**13,841**
1982	9,678	2,639	12,317	961	105	**13,384**
1983	9,974	2,506	12,480	793	109	**13,380**
1984	9,912	2,786	12,698	829	-	**13,528**
1985	9,617	2,596	12,214	897	-	**13,111**
1986	9,628	2,552	12,180	857	-	**13,038**
1987	9,707	2,580	12,286	790	-	**13,076**

NOTE: Motor fuel is defined as all gasoline covered by state motor fuel tax laws plus diesel fuel and LPG used in the propulsion of motor vehicles. Military use of motor fuel and all aviation fuel use are excluded in the Department of Transportation data. Figures for highway use of fuels may be understated because of refunds given on fuel for nonhighway use such as agriculture.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, annual reports, 1950-87.

TABLE 5.6
MONTHLY GASOHOL CONSUMPTION, 1980-87
(thousands of gallons)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.	TOTAL
1980	9	8	13	0	10	5	14	16	17	18	25	23	157
1981	22	13	19	5	11	8	17	51	57	31	92	147	474
1982	162	233	252	508	987	1,286	1,261	1,213	843	1,023	1,208	1,194	10,170
1983	925	1,219	1,080	1,013	1,115	1,238	1,492	952	629	642	729	292	11,326
1984	579	323	937	1,230	847	923	809	1,281	598	776	950	928	10,181
1985	615	1,107	1,022	946	678	780	443	713	548	276	577	374	8,079
1986	349	118	174	323	233	99	178	81	663	439	419	378	3,454
1987	357	74	350	101	72	167	268	277	181	153	130	321	2,451

NOTE: Commercial marketing of Montana-produced gasohol began in October 1981. Prior to that time, most of the gasohol in Montana was imported. Since late 1981, there has been very little interstate shipment of gasohol; therefore, the amount of gasohol produced in Montana should be closely approximated by these consumption figures.

SOURCE: U.S. Department of Transportation, Federal Highway Administration, *Highway Statistics*, 1980-87.

TABLE 5.7
PETROLEUM PRODUCT CONSUMPTION ESTIMATES, 1960-87
(thousand barrels)

Year	Aviation Gasoline	Distillate Fuel	Jet Fuel	LPG[1]	Motor Gasoline	Residual Fuel
1960	972	4,898	263	737	6,922	2,063
1961	1,377	5,278	278	859	6,979	2,580
1962	444	5,549	309	819	7,553	3,052
1963	466	5,393	338	766	7,481	2,852
1964	317	5,702	358	925	7,374	2,300
1965	290	4,962	382	926	7,709	1,241
1966	184	5,695	439	1,167	7,953	1,459
1967	122	3,394	572	1,585	8,104	1,231
1968	62	4,113	695	1,689	8,585	1,509
1969	37	4,641	804	1,690	8,737	1,556
1970	40	4,827	647	1,326	9,262	1,268
1971	39	5,715	766	1,402	9,494	1,262
1972	83	6,206	761	1,705	10,137	1,469
1973	98	6,989	756	1,503	10,883	1,765
1974	93	7,840	779	1,466	10,550	2,262
1975	71	7,586	817	1,370	10,630	2,178
1976	94	8,411	753	1,421	11,605	2,525
1977	92	8,258	772	1,368	11,100	2,506
1978	87	8,232	699	1,662	12,809	2,502
1979	122	9,037	907	1,094	11,162	5,773
1980	159	7,509	920	1,806	10,416	4,025
1981	177	6,469	800	1,027	10,797	2,494
1982	92	5,828	625	1,446	10,429	1,608
1983	102	8,863	652	1,497	10,525	1,306
1984	77	9,446	642	1,173	10,451	1,336
1985	91	11,317	678	1,720	10,185	615
1986	105	7,004	867	1,509	10,158	198
1987	82	6,556	718	1,679	10,234	139

[1] Liquefied petroleum gases (LPG) series estimates since 1979 may be affected by the changing data sources and estimation procedures. For details concerning changes, the reader should consult the source publication.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates*, 1960-87 (DOE/EIA 0214).

TABLE 5.8
RESIDENTIAL PETROLEUM PRODUCT CONSUMPTION ESTIMATES, 1960-87
(thousand barrels)

Year	Distillate Fuel	LPG[1]
1960	262	506
1961	335	616
1962	335	560
1963	328	499
1964	312	655
1965	277	636
1966	286	758
1967	196	994
1968	250	1,068
1969	289	1,072
1970	249	887
1971	397	905
1972	436	1,094
1973	495	965
1974	542	1,026
1975	589	973
1976	646	993
1977	616	993
1978	657	1,276
1979	675	606
1980	421	829
1981	273	503
1982	352	736
1983	449	901
1984	459	480
1985	345	670
1986	351	666
1987	247	690

[1] Liquefied petroleum gases (LPG) estimates since 1979 may be affected by the changing data sources and estimation procedures. For details concerning changes, the reader should consult the source publication.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates*, 1960-87 (DOE/EIA 0214).

TABLE 5.9
COMMERCIAL PETROLEUM PRODUCT CONSUMPTION ESTIMATES, 1960-87
(thousand barrels)

Year	Distillate Fuel	LPG[1]	Motor Gasoline	Residual Fuel
1960	297	89	135	2
1961	380	109	146	3
1962	380	99	121	4
1963	372	88	141	4
1964	354	116	127	3
1965	315	112	144	1
1966	324	134	123	1
1967	223	175	135	1
1968	284	188	133	1
1969	329	189	107	1
1970	283	157	220	1
1971	451	160	127	1
1972	496	193	168	1
1973	562	170	136	1
1974	616	181	125	2
1975	668	172	174	2
1976	734	175	163	3
1977	699	175	157	3
1978	746	225	167	4
1979	766	107	179	11
1980	346	146	92	7
1981	380	89	110	0
1982	183	130	127	5
1983	1,104	159	76	172
1984	1,128	85	61	176
1985	863	118	72	581
1986	403	118	76	157
1987	305	122	79	78

[1] Liquefied petroleum gases (LPG) estimates since 1979 may be affected by the changing data sources and estimation procedures. For details concerning changes, the reader should consult the source publication.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates*, 1960-87 (DOE/EIA 0214).

TABLE 5.10
INDUSTRIAL PETROLEUM PRODUCT CONSUMPTION ESTIMATES, 1960-87
(thousand barrels)

Year	Distillate Fuel	LPG[1]	Motor Gasoline	Residual Fuel
1960	1,500	112	816	1,684
1961	1,841	104	923	1,960
1962	2,159	125	685	2,575
1963	2,174	145	796	2,438
1964	2,331	128	746	1,986
1965	1,693	164	887	914
1966	2,123	254	681	980
1967	1,033	356	791	882
1968	1,222	359	745	1,242
1969	1,373	361	476	1,212
1970	1,274	246	635	1,123
1971	1,750	282	570	1,174
1972	1,863	339	702	1,390
1973	2,073	302	568	1,577
1974	2,413	206	503	2,126
1975	2,494	174	774	1,963
1976	2,926	202	774	2,303
1977	2,890	162	703	2,176
1978	2,375	115	578	2,270
1979	2,787	364	663	5,609
1980	1,925	786	619	4,018
1981	1,943	382	663	2,494
1982	1,396	551	632	1,603
1983	3,173	388	509	1,132
1984	3,241	552	558	1,158
1985	5,798	868	677	33
1986	2,124	658	637	42
1987	1,802	801	573	61

[1] Liquefied petroleum gases (LPG) estimates since 1979 may be affected by the changing data sources and estimation procedures. For details concerning changes, the reader should consult the source publication.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates*, 1960-87 (DOE/EIA 0214).

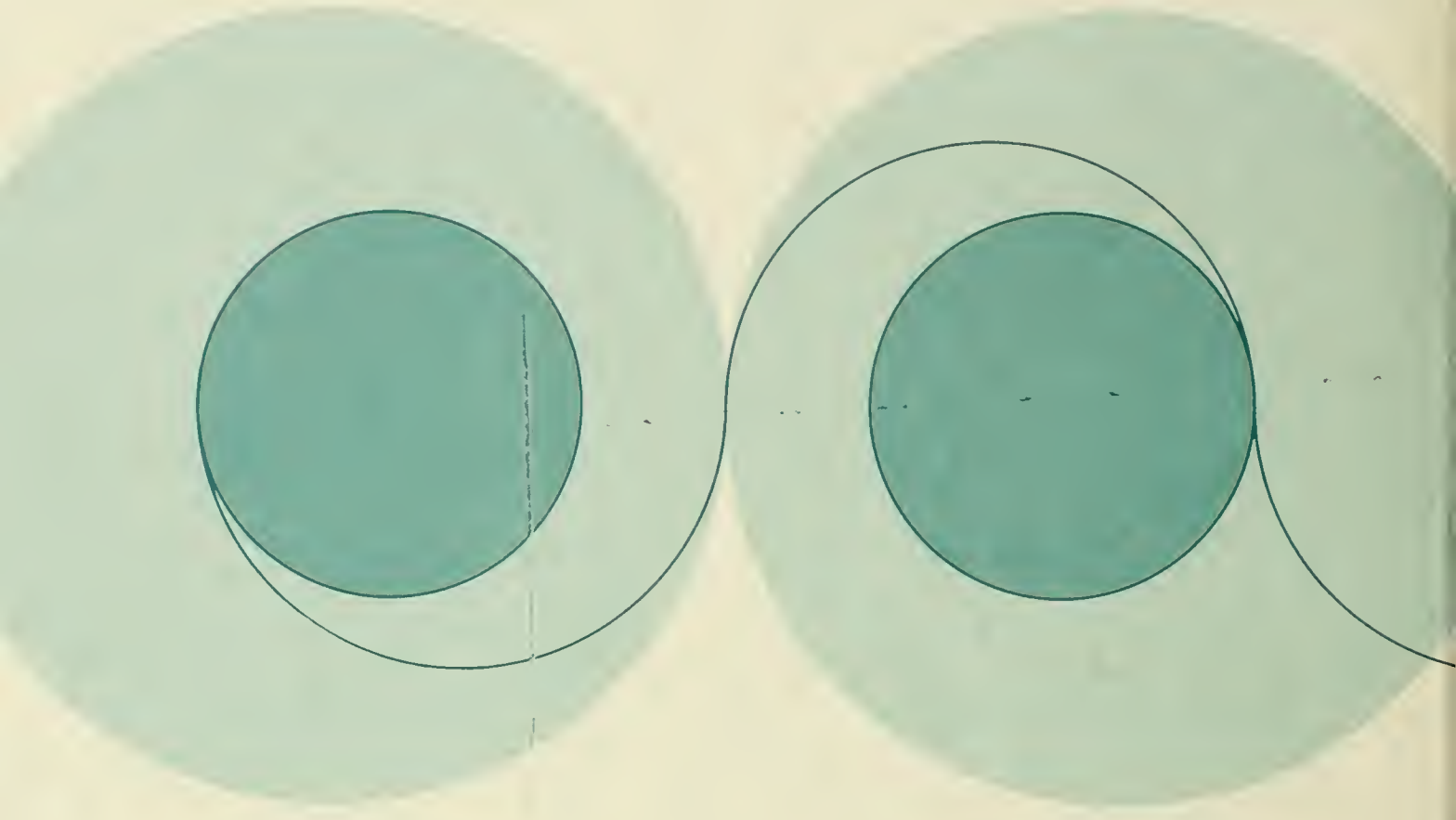
TABLE 5.11
TRANSPORTATION PETROLEUM PRODUCT CONSUMPTION ESTIMATES, 1960-87
(thousand barrels)

Year	Aviation Gasoline	Distillate Fuel	Jet Fuel	LPG[1]	Motor Gasoline	Residual Fuel
1960	972	2,839	263	29	5,972	377
1961	1,377	2,721	278	31	5,910	617
1962	444	2,675	309	35	6,747	471
1963	466	2,520	338	34	6,544	410
1964	317	2,705	358	26	6,501	307
1965	290	2,676	382	13	6,678	325
1966	184	2,961	439	21	7,148	396
1967	122	1,941	572	60	7,178	342
1968	62	2,356	695	73	7,708	243
1969	37	2,649	804	68	8,155	238
1970	40	3,020	647	36	8,407	119
1971	39	3,116	766	56	8,797	87
1972	83	3,408	761	78	9,267	63
1973	98	3,834	756	65	10,179	44
1974	93	4,266	779	53	9,922	122
1975	71	3,835	817	50	9,682	160
1976	94	4,101	753	50	10,668	141
1977	92	4,049	772	37	10,240	136
1978	87	4,451	699	46	12,064	134
1979	122	4,791	907	18	10,320	24
1980	159	4,759	920	45	9,705	0
1981	177	3,834	800	52	10,024	0
1982	92	3,866	625	29	9,671	0
1983	102	4,106	652	49	9,940	3
1984	77	4,540	642	56	9,831	3
1985	91	4,273	678	63	9,437	*
1986	105	4,101	867	67	9,445	0
1987	82	4,157	718	67	9,582	0

* Less than 0.5.

[1] Liquefied petroleum gases (LPG) estimates since 1979 may be affected by the changing data sources and estimation procedures. For details concerning changes, the reader should consult the source publication.

SOURCE: U.S. Department of Energy, Energy Information Administration, *State Energy Data Report, Consumption Estimates*, 1960-87 (DOE/EIA 0214).



Montana Department of
Natural Resources & Conservation
1520 East Sixth Avenue
Helena, MT 59620-2301